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BETTER FRUIT

VOLUME VI

FEBRUARY, 1912

NUMBER 8

SPRAYING EDITION



By courtesy of the Davis Creek Orchards Company
THE WINTER BANANA APPLE

BETTER FRUIT PUBLISHING COMPANY, PUBLISHERS, HOOD RIVER, OREGON

Subscription \$1.00 per Year in the United States and Canada; Foreign, Including Postage, \$1.50

Single Copy 10 Cents

Dangerous Fruit Pests are Unknown
in the famous

Bitter Root Valley

on Montana's Pacific Slope
Where the Wormless Apples Grow

Smudging Is Unnecessary

There has not been a killing frost on the bench lands in the growing season in the history of the Valley. There are no dust storms.

Pure water and sunshine 300 days in the year make ideal health conditions.

Net profits annually range from \$2,000 to \$5,000

on a matured apple orchard of only ten acres.

Undeveloped land in this remarkable fruit district can still be bought for less money than is asked in other valleys less perfectly adapted by nature for successful fruit growing. Values now range from \$250 to \$350 per acre.

Developed tracts of ten acres, with contract to cultivate and care for same to five-year maturity, cost only \$5,000 if purchased now. Easy terms of payment for both developed and undeveloped land.

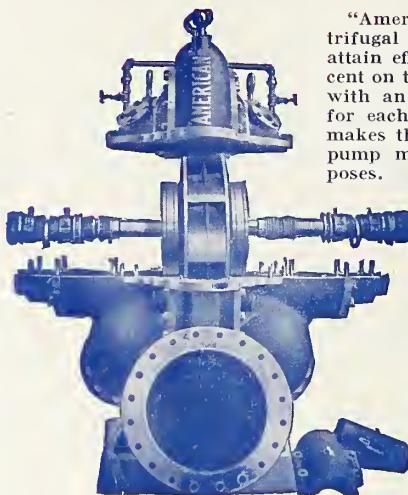
Detailed information upon request.

Bitter Root Valley Irrigation Co.

First National Bank Building, CHICAGO

All the Grand Prizes and All the Gold Medals
Given by the Alaska-Yukon-Pacific Exposition at Seattle
in 1909 to pumps were awarded to

"American" Pumping Machinery



"American" single stage centrifugal pumps are guaranteed to attain efficiencies of 60 to 80 per cent on total heads up to 125 feet, with an equal increase in head for each additional stage, which makes them the most economical pump made for irrigation purposes.

"American" centrifugals are made in both horizontal and vertical styles, in any size, in any number of stages, and are equipped with any power.

Write for "Efficiency Tests of American Centrifugals," by the most eminent hydraulic engineer on the Pacific Coast. Complete catalogue, No. 104, will be sent free.

The American Well Works

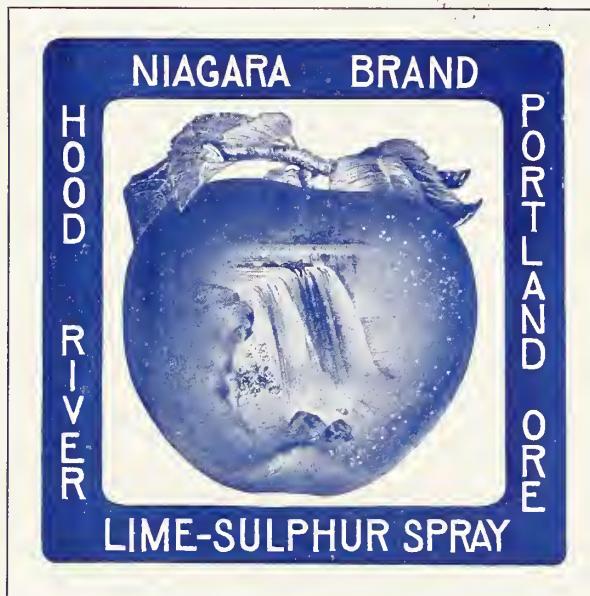
General Office and Works: Aurora, Illinois, U. S. A.

Chicago Office: First National Bank Building

PACIFIC COAST SALES AGENCIES:

70 FREMONT STREET, SAN FRANCISCO
311 SOUTH LOS ANGELES STREET, LOS ANGELES
SECOND AND ASH STREETS, PORTLAND, OREGON
1246 FIRST AVENUE SOUTH, SEATTLE
305 COLUMBIA BUILDING, SPOKANE

HERE IS PROOF



Successful orchardists know that it pays to use the best spray, no matter what the cost might be. You know that **Hood River Apples** represent the standard of perfection. You probably know that they are sprayed carefully, systematically, early, often and thoroughly, but do you know that **Niagara Spray** is used almost exclusively in this great prize winning district? Yes, and because of "NIAGARA'S" strength (a. e. 19.65 Total Lime and 31.44 Total Sulphur) it is actually cheaper than inferior sprays that cost less. Note the result of this test made at the Oregon Agricultural College:

	Total Lime	Total Sulphur	Winter Strength Dilution	50 Gals. Diluted	Cost per Gal. Diluted
Sample No. 1.....	10.73	26.63	1 to 9.24	512	17 1/2 c
Sample No. 2.....	11.94	30.03	1 to 10.45	572	15.7 c
Sample No. 3.....	12.00	29.21	1 to 10.12	556	16 c
Sample No. 4.....	12.12	23.98	1 to 8.38	469	19 c
SAMPLE OF NIAGARA	19.65	31.44	1 TO 11.00	600	15 c

Niagara is a strictly pure lime and sulphur solution so chemically made as to produce a clear, uniform liquid, permanently retaining the lime and sulphur in suspension.

We are agents for the celebrated A. B. Ansbacher's TRI-ANGLE Arsenate of Lead.

You should spray now for **SAN JOSE SCALE** and **APHIS** or **PLANT LICE**
(unless you sprayed immediately after the leaves fell in the fall)

Write for further information or see your nearest dealer.

Hood River Spray Manufacturing Co., P.O. Box 54R, Hood River, Oregon

Be It Resolved:

Appreciation of past service and confidence in future
forcibly expressed by people who know.

Whereas, for the past two seasons the Northwestern Fruit Exchange has handled the fruit crop of the Cashmere Fruit Growers Union, the members thereby receiving prices materially higher than any other association or individual in the Wenatchee Valley, and that the said Exchange has made a wide distribution of our fruit, thereby increasing our market possibilities, and that all the business relations of our Union and the Exchange having been of an agreeable and satisfactory character, therefore

Be it resolved, that it is the sense of this meeting that our Directors for the coming year be advised to continue employing the Northwestern Fruit Exchange as a selling agent, subject to such precautions and stipulations as may seem fit and necessary.

Be it resolved, that it is the sense of this meeting that the movement as suggested by Rogue River towards affiliating the sections of the Northwest is a good one, and that we, as a body, endorse and approve of a movement in this direction, and that we use our influence individually and as an organization for the success of this movement.

CASHMERE FRUIT GROWERS UNION

Cashmere, Washington,
January 9, 1912.

Northwestern Fruit Exchange,
Portland, Oregon.

Gentlemen: We are pleased to report to you some of the proceedings of our Annual Stockholders' Meeting held here yesterday. We enclose herewith copies of two resolutions enthusiastically adopted by the members, one indorsing the work of the Exchange and the other indorsing the affiliation of the principal fruit districts of the Northwest. A strong crop contract was adopted, copy of which we shall be pleased to send you when draft of same is complete.

The Board of Directors was increased from five in number to seven. Messrs. W. E. Hinman, H. J. Olive, J. C. Parsons, J. H. Sprague, John Knox and E. E. Tigner were elected Directors and with Mr. J. F. Sugrue as a holdover member, constitute the entire Board--certainly an excellently efficient and capable Board of Directors.

The most noticeable feature and the most pleasing also, was the entire absence of bickering, bitterness and discord, and the prevalent spirit of harmony and general satisfaction.

The outlook for the Union for the coming season is indeed bright and encouraging. We cannot but express herewith in a direct, brief manner our appreciation of the part the Exchange has played in bringing about the present excellent condition of the Union.

Yours very truly,

CASHMERE FRUIT GROWERS' UNION,
By (Signed) J. L. Padfield,
Secretary.

NORTHWESTERN FRUIT EXCHANGE

418-423 Spalding Building, Portland, Oregon

REGINALD H. PARSONS President
W. F. GWIN General Manager
CHAS. A. MALBOEUF Secretary

IF YOU WANT TO MARKET
YOUR
FRUIT
RIGHT

ALWAYS SHIP TO

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WHOLESALE FRUITS
AND PRODUCE

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The Old Reliable
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WHOLESALE
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Wholesale Fruits and Produce

We make a specialty
in Fancy Apples, Pears and
Strawberries

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W. W. BOLLAM

Dryer, Bollam & Co.
**GENERAL
COMMISSION MERCHANTS**

128 FRONT STREET

PHONES: MAIN 2348
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PORTLAND, OREGON

LEVY & SPIEGL
WHOLESALE
FRUITS AND PRODUCE
Commission Merchants
SOLICIT YOUR CONSIGNMENTS
Top Prices and Prompt Returns
PORTLAND, OREGON

Correspondence Solicited
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BUTTE, MONTANA
Branch Houses:
Livingston, Bozeman, Billings
Montana
Pocatello, Idaho
Salt Lake City, Utah
Wholesale Fruit and Produce
WE HAVE MODERN COLD STORAGE FACILITIES
ESSENTIAL FOR HANDLING YOUR PRODUCTS
A strong house that gives reliable market
reports and prompt cash returns

Richey & Gilbert Co.
H. M. GILBERT, President and Manager
Growers and Shippers of
**YAKIMA VALLEY FRUITS
AND PRODUCE**
Specialties: Apples, Peaches,
Pears and Cantaloupes
TOPPENISH, WASHINGTON

GET ACQUAINTED
WITH
HILTON-MARTYN-BALL CO.
Wholesale Fruits
and Produce
103 FRONT STREET (near Stark)
PORTLAND, OREGON

SGOBEL & DAY

ESTABLISHED 1869

235-238 West Street NEW YORK

Strictly commission house. Specialists in
Apples Pears and Prunes. Exporters of
Newtown Pippins to their own representatives in England.

QUALITY
QUALITY
QUALITY

No-Rim-Cut Tires

(10% Oversize)

1911 Sales—409,000 Tires

Please stop and consider—you men who use tires.

Note how motorists are coming to this patented type.

Last year's output would completely equip 102,000 cars.

Goodyear No-Rim-Cut tires have come to outsell every other tire in existence.

Yet the sale is only beginning. In two years the demand has multiplied six times over.

This year, 127 leading motor car makers have contracted for Goodyear tires.

That's the result of experience.

Men have proved that these tires cut tire bills in two.

Men want oversize tires—men want tires that can't rim-cut—when they cost no extra price.

So, as fast as men learn the facts, they insist on Goodyear No-Rim-Cut tires.

Tire Bills Cut in Two

These are the facts we ask you to consider.

The old-type tire—the hooked base tire—rim-cuts when partly deflated.

Such a tire, if punctured, may be wrecked in a moment—ruined beyond repair.

Statistics show that 23 per cent of all ruined clincher tires have been rim-cut.

No-Rim-Cut tires save that wreck and that worry. They make rim-cutting entirely impossible.

Then No-Rim-Cut tires are 10 per cent oversize.

That means more air—more carrying capacity. It avoids the blow-outs due to overloading.

Under average conditions, 10 per cent oversize adds 25 per cent to the tire mileage.

Our average

oversize, measured by cubic capacity, is much over 10 per cent. A recent comparison with five other makes showed it 16.7 per cent.

These two features together—No-Rim-Cut and oversize—under average conditions cut tire bills in two.

No Extra Price

No-Rim-Cut tires used to cost one-fifth more than other standard tires. Now they cost no extra price.

So these features are free. The saving is clear.

Do you wonder that tens of

thousands of users insist on these patented tires?

The Final Tire

We have spent 13 years in making automobile tires.

After 13 years of constant improvement, we have brought these tires close to perfection. It will never be possible, in our estimation, to make a better tire.

These perfect tires—made so they can't rim-cut, made oversize—are the tires which we offer you.

Consider these facts and judge for yourself if it pays men to insist on them.

Our new Tire Book is ready. It is filled with facts which motor car owners should know. Ask us to mail it to you.



THE GOODYEAR TIRE & RUBBER COMPANY, Akron, Ohio

Branches and Agencies in 103 Principal Cities

We Make All Kinds of Rubber Tires, Tire Accessories and Repair Outfits

(467)

CALIFORNIA

THIS WINTER

FAIRLY THE WORLD OVER

for its splendid hosteries, its varied attractions, fine beaches, hot springs and pleasure resorts — can be reached with ease by the

**Oregon-Washington
Railroad and Navigation Company**
AND
Southern Pacific Company
"ROAD OF A THOUSAND WONDERS"

\$55.00

Portland to Los Angeles and Return

with correspondingly low fares from all points on O.-W. R. & N. Co. Tickets on sale daily, good six months with stopovers going and returning within limit.

Handsome illustrated literature can be secured from any of our agents, or address

W.M. McMURRAY
General Passenger Agent
Portland, Oregon

The HARDIE TRIPLEX

The Sprayer with the Trouble Left Out



Each year demonstrates the fact that the Hardie Triplex is best adapted to Northwestern orchard conditions.

This machine is built to work successfully in any kind of an orchard, whether it is closely set or open, level or hilly.

By using good materials in construction, we give you light weight without sacrifice of strength.

All the liquid you need and at an even continuous high pressure.

A Hardie Triplex means to you Better Spraying in less time and at lowest cost.

A postal card brings you our new 64-page catalog; giving a detailed description of the construction of our Triplex and twenty other hand and power sprayers; new spraying devices, etc.

Write for it today.

The Hardie Manufacturing Company

Hudson, Michigan

49 North Front Street, Portland, Oregon

An Unqualified Success

EVERY PURCHASER SATISFIED

Clearfield, Utah, December 28, 1911.
Schellenger Fruit Grading Machine Company

Gentlemen: I have used the Schellenger Fruit Grading Machine for the past year and graded eleven cars of apples and two cars of peaches, and found it to do number one work and a money-saver of three to five cents per box.

Yours truly,
(Signed) EZRA V. STEED.

The Schellenger 1912 Apple Grader WIPES and GRADES THE APPLES AT THE SAME TIME. The wiper is ADJUSTABLE, SO ANY DEGREE OF WIPING CAN BE DONE from merely dusting the fruit to polishing it.

Grading fruit for size must always be done with reference to the cheek to cheek diameter. OUR 1912 MACHINES DO THIS not only with round apples, BUT WITH THE ELONGATED VARIETIES AND WITH PEARS.

Our smallest 1912 grader sorts 9,000 apples per hour, or twice as many as the 1911 model did. All 1912 machines are equipped with a full set of TEN LARGE PACKING TABLES.

Schellenger Fruit Grading Machine Co.
INCORPORATED

633-635 South Fourth West Street
SALT LAKE CITY, UTAH



Millions of Dollars

were lost by the orange and lemon growers of California last Christmas night because they were not equipped with proper heating devices. In some districts temperatures of 18 above were recorded, and a 14-hour burn was necessary. Every user of

The Hamilton Reservoir Heater

made good against these terrific conditions, and the valuable lesson was learned at a tremendous cost that none but a large heater with reservoir capacity and with the REGULATED FIRE provides full protection for such conditions.

The growers of California no longer want inefficient, small heaters, as they will not do for a 14-hour burn against 12 to 14 degrees of frost.

Mr. Fruit Grower, you had better profit by their experience when buying your heaters, and get the most powerful equipment and one that holds several gallons of oil. Write us for the facts about this great frost fight and the only heater that gave every user full satisfaction. The big 6-gallon heater proved the big winning factor. Write us for information.

Hamilton Orchard Heater Co.
GRAND JUNCTION, COLORADO

This Light Weight Grader Will Solve Your Irrigation Problems

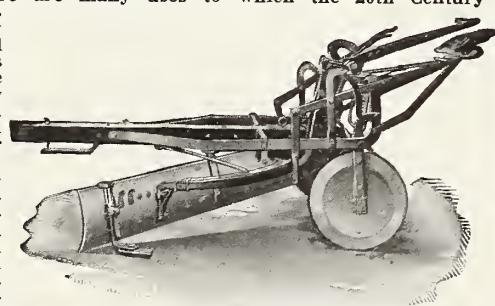
It is an all-steel one-man machine. It weighs only 600 pounds. It will stir your soil, level your land, cut laterals, pick up dirt and drop it where you want it, and cut ditches 24 to 36 inches deep at a cost of 2 cents a rod. It will do more work than big heavy graders in less time and with less effort. One man with two horses operates it. Ditches cut with the 20th Century Grader are "V" shaped, with firm, solid sides—no fear of their being washed down.

20th Century Grader

is a many purpose, easily operated machine that pays for itself over and over again and puts money into your pocket. To get big results your work must be right, so you must have the right machine.

Let us tell you what others say about this wonderful machine. We want to prove to your satisfaction that it's a genuine money-maker. There are many uses to which the 20th Century Grader is specially adapted and many ways you can make big money by using it on your own land and on your neighbors'.

Write for our interesting and valuable free book giving full information about this money-making machine, what it has done for thousands and will do for you.



THE BAKER MANUFACTURING CO.
542 Hunter Building
CHICAGO, ILLINOIS

Printing

for Nurserymen and Fruit Growers

BETTER FRUIT is acknowledged to be the leading magazine of the United States—if not of the world—devoted to horticulture. All of the mechanical end of the production of this magazine is carried through to completion in our establishment. We feel that the experience thus gained puts us in first place when it comes to producing printing particularly intended for use in the business of the nurseryman or the fruit grower. Any inquiries along this line will receive prompt and courteous attention. If the correspondence thus started leads to the placing of an order with us, we guarantee that results will be satisfactory—to both parties concerned.

F. W. Baltes and Company
Printers, Portland, Oregon

Use Labels! It Pays

*A GOOD COMBINATION
AND A WINNER*

*1ST GOOD FRUIT
2ND GOOD PACKING
3RD GOOD LABELS*

THE LABEL HELPS.

Schmidt Lithograph Co.

E. SHELLEY MORGAN, MANAGER.

408 WELLS FARGO BLDG.

PORTLAND, OREGON.

SAMPLES AND PRICES ON APPLICATION

Faculty Stronger Than Ever
More Progressive Than Ever

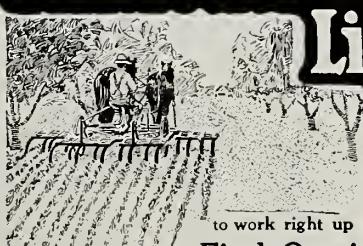
Results Better Than Ever
Attendance Larger Than Ever

ATTEND THE BEST

Behunke-Walker Business College

PORLTAND, OREGON

Find Out About the Forkner Light-Draft Harrow!



THIS low-priced harrow for orchards and vineyards—and general use—is a world-beater. Wonderfully light of draft—weight carried on wheels, not on horses' necks. Great worker—20 to 30 acres a day with one team—and every inch of soil cultivated thoroughly—lifted and turned in long wavy level. Best of all—it hangs low and has great extension—making it a snap to work right up to trees without horse or driver disturbing boughs or fruit.

Find Out in Your Orchard—At Our Risk!

WRITE TODAY for catalog and 30 day trial offer. Pick the machine suited to your soil and orchard and use it for a

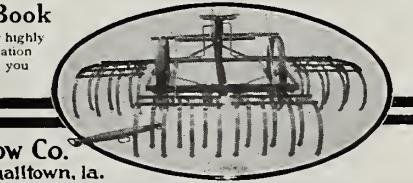
Send for This Free Book

"Modern Orchard Tillage"—written by highly successful orchardist—contains information that may be worth hundreds of dollars to you. Sent for the asking.

month—and send it back if you don't find it the finest cultivator made.



Light Draft Harrow Co.
901 E. Nevada St. Marshalltown, Ia.



BETTER FRUIT

Has no peer in the Northwest

And so we have established

THE FRUIT JOURNAL

along similar lines in behalf of the great irrigated fruit districts of the Rocky Mountain region, a companion paper to this, your favorite fruit magazine.

We have made it up-to-date, clean, high class editorially, mechanically and pictorially.

The subscription rate is \$1.00 per year. It is worth it.

THE INTERMOUNTAIN FRUIT JOURNAL

Grand Junction, Colorado

MANY TIMES A YEAR, REGULARLY,

You Need a Reliable Hand Spray Pump. Here Are Two "Winners" and Some Facts About Them that You Need to Know

A dozen times a season, more or less, you wish you had a good hand spray pump. Perhaps you operate power machines, but you need some hand sprayers beside.

Power outfits sometimes "lay off." For instance, your batteries may give out. You can't blame that on the engine, can you?—yet the whole outfit must lie idle till you can get some new ones. Or, you may run short of gasoline; when such things happen, you'd be mighty glad for some hand spray pumps to fall back on.

Then consider this—if you have several different varieties of the same fruit, the trees will bloom at different times and the petals will be dropping for several days. You've got to spray each tree at the right time—just after the petals are off, but before the calyx has had time to close—so you must go over the orchard two or more times in order to catch every tree. Only a few trees may need it on a certain day; but you can't afford to pass them by, so you'll have to take parts of two or more days to it. A Deming Hand Sprayer would do such work perfectly—and any other spraying that you have to do. We show two styles here—the "Samson" and the "Planet."

The Deming "Samson" Spray Pump You Know Very Well Already

For an all-around machine, to do effective work in good-sized orchards of full-grown trees, we do not think any spray pump excels the "Samson." We have been making it for four years, and have proved it most effective.

The "Samson" throws spray with great force, enables the operator to cover a lot of trees in a day, yet works very easily considering that 100, 125 and 150 pounds pressure can be maintained steadily without extra-hard pumping—depending of course on the number of nozzles used.

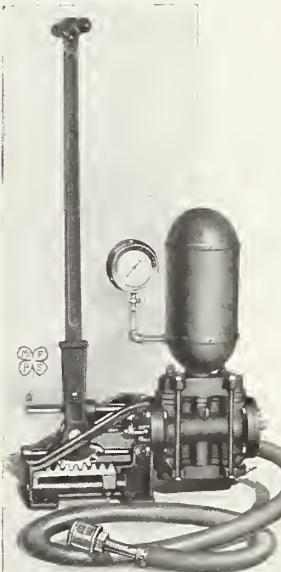
We Now Introduce A New Hand Sprayer, The "Planet"

—and we predict for it as great popularity as the "Samson" has heretofore enjoyed. We need not say much about its strength and durability—the illustration shows it in every line. You can see the "character" that's built into this pump. You don't have to be told that it will work steadily, put up a heavy pressure, and stand all sorts of hard knocks—the picture shows that.

The Deming "Planet" is designed for the operator's comfort. The handle is just long enough—you can pump for hours, without getting half as tired as you would if working the handle of a horizontal pump. The leverage helps, too—you get a big "purchase" with that long stroke.

Another good point is the "eog" principle. This holds the pump plunger in perfect alignment, preventing all sidewise motion. The air chamber is large enough to hold the pressure steady and make pumping easier. A gauge is furnished, registering up to 400 pounds.

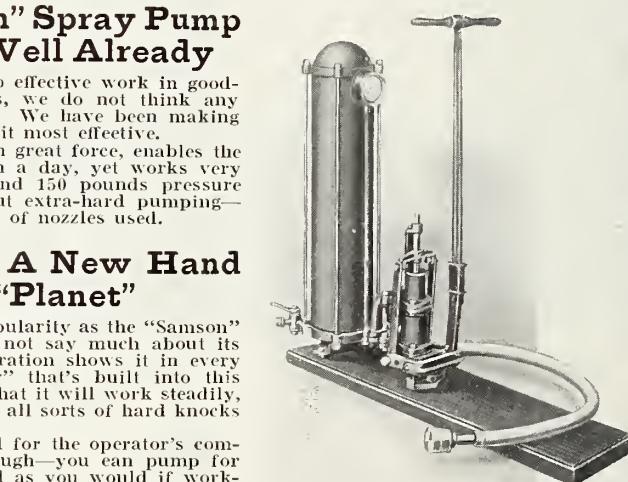
Other features are of the same high order as you find in all Deming Pumps—brass valves and valve seats; brass plunger; brass-lined cylinder; brass working parts, in fact, wherever the liquid touches.



The Deming "Planet"

Our Catalogue Tells About All Our Sprayers

We make Sprayers for every purpose—various types of gasoline engine outfits; pumps for connection with the engine you already have; hand pumps in many styles—barrel pumps, knapsack and bucket outfits. Nearly twenty years' experience building them is your guarantee.



The Deming "Samson"

Buy Deming Outfits From Our Nearest Agency

Deming Spray Pumps are sold by the stores of Crane Co., and by leading hardware and implement stores. YOUR dealer has them, or can get them for you. Better see him NOW; if he refuses, or tries to sell you something else, write us, mentioning his name, and we will supply you direct at factory prices.

Crane Co., Pacific Coast Agents, Portland, Seattle, Spokane, San Francisco
THE DEMING CO., Makers of Pumps for All Uses, 335 Success Building, Salem, Ohio

DEMING

SPRAY PUMPS

DEMING

Let Us Make An Orchard to Order for You at Mosier

Here is about what it will cost you:

	Per Acre
Cost of raw land (average).....	\$75.00
Cost of clearing land.....	55.00
Cost of breaking.....	5.00
Cost of setting trees.....	16.50
Miscellaneous, for five years.....	50.00
First year's care.....	15.00
Second year's care	13.00
Third year's care.....	13.00
Fourth year's care.....	15.00
Fifth year's care.....	20.00
	\$277.50

Income

First year's products (net).....	\$20.00
Second year's products (net).....	35.00
Third year's products (net).....	40.00
Fourth year's products (net).....	30.00
Fifth year's crop, apples (net)	65.00
	190.00

A bearing orchard will cost you..... \$87.50

We are fully equipped to do this work, and make no charge, except a small monthly amount for superintending.

One of the best features of the plan is, that you may select your land from any raw land on our large list, and are not confined to any given tract. We will be glad to furnish you any further information.

D. D. HAIL CO.

MOSIER, OREGON

NO TROUBLE TO ANSWER QUESTIONS

What Constitutes a Good Spray Pump?

High Pressure—to throw a strong, fine spray.

A Pump—of sufficient capacity under slow speed.

An Agitator—to keep mixture well stirred so that it cannot clog pipes and nozzles.

Some Method of Cleaning the strainer.

Ask any fruit farmer with experience. He will tell you that the most annoying thing is to find pump, suction or nozzles clogged when he has a tank full of spray mixture in the orchard and must *clean out* before his sprayer will work.

Here We Come In Automatic Brushes with Mechanical Agitators furnished with Empire King Barrel Pump and Watson-Ospraymo Potato Sprayer, also with Leader-Triplex Gasoline Engine Machines of 10 gallons per minute capacity, and capable of a nozzle pressure of 250 to 300 pounds.

These Triplex Pumps are run only 40 to 50 revolutions per minute. This slow speed means long life, greater efficiency, less up-keep cost, the weight is not too heavy for two horses—1550 pounds with 2 H.P. engine and 150 gallon tank, including wagon with five-inch tires; or with 3½ H.P. engine and 200 gallon tank, 1800 pounds.

The prices are not too high for efficiency, durability, capacity and satisfaction.

Are you interested? A postal will bring you into touch with our nearest agency.

FIELD FORCE PUMP CO.
Dept. B ELMIRA, N.Y.

Insist on
This Trade Mark



NURSERY STOCK OF ABSOLUTE RELIABILITY

That's the only kind to buy. Good trees bring success and poor trees failure. Fruit growers know this. They do not experiment. They buy non-irrigated, whole root, budded trees, and we number scores of them on our list of well pleased customers. We have prepared this season for an immense business. That means trees, trees, trees without limit as to variety and quantity. We also have an immense stock of small fruits and ornamentals. We solicit your confidence, and will take care of the rest. Catalogue on application.

Salem Nursery Company, Salem, Oregon

Reliable and live salesmen wanted

WOULDN'T YOU

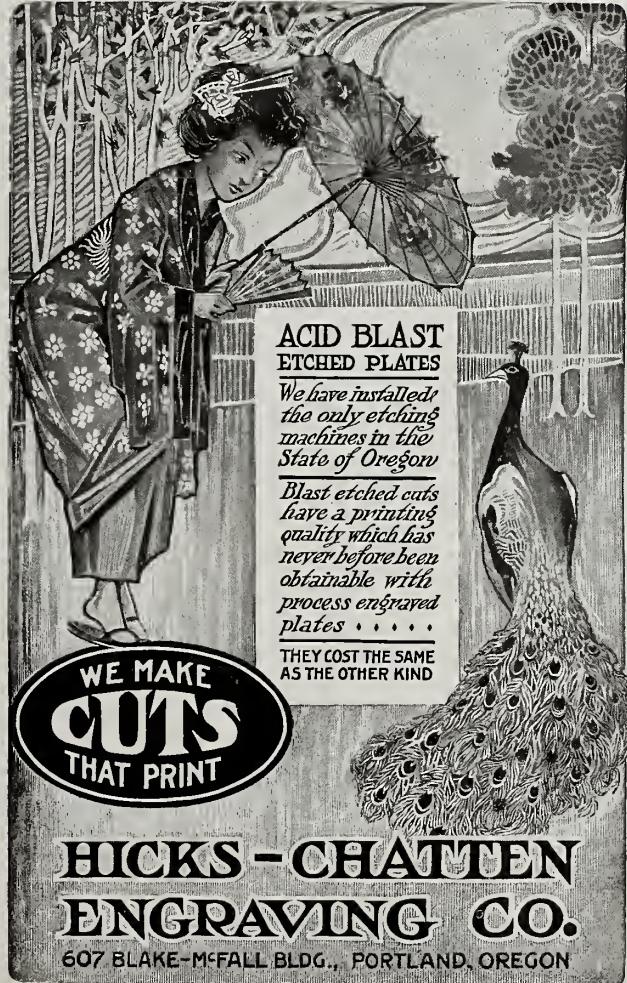
Like to move to a new country if it was not for the PIONEERING?

OPPORTUNITY

Is a new fruit district (under irrigation five years) but three miles from the city of Spokane in the famous Spokane valley. All our tracts have electric lights, domestic water, telephones, in fact every modern convenience. Large profits and an ideal home.

Get particulars from OPPORTUNITY-VERA LAND CO.
403 Sprague Avenue, Spokane, Washington

**HICKS-CHATTEEN
ENGRAVING CO.**
607 BLAKE-MCFALL BLDG., PORTLAND, OREGON





SAVE YOUR CROPS

and Fruits from the Ravages of Frost by Acting at the Right Time

Orchard Heating and Smudging won't save your crop after the damage is done—it is extravagant and useless until the temperature reaches the danger point. The one great, important feature is *ACTION AT THE RIGHT TIME*. The man with "**Tycos**" AUTOMATIC ALARM THERMOMETERS is warned and startled into action at *EXACTLY THE RIGHT TIME*.

"**Tycos**" Automatic Alarm Thermometers

May be Installed with any system of Orchard Heating or Smudging

And will save their expense the first season, whether you smudge or not. Simply but strongly constructed—protected by heavy metal weather-proof case—and may be installed by anyone of average intelligence. Rings a bell, located wherever desired, at practically any distance from the Thermometer itself, at the exact moment the temperature in the orchard reaches the danger point. All unnecessary labor, time and expense may be avoided until the ringing of the alarm.

The "**Tycos**" Automatic Alarm Thermometer may be installed in Single Thermometer Alarms or Annunciator Connection Systems, according to requirements. If your supply dealer cannot furnish you, write direct to us. Do not accept any substitute device. Get the genuine—look for the name.

Send for Circular on the "**Tycos**" Automatic Alarm Thermometer



Whenever you buy a Thermometer of any kind, always look for the name "**Tycos**"—there's a "**Tycos**" Thermometer for every purpose. The name is your protection and our guarantee. Write for booklets, "*Incubator Thermometer Facts*" and "**Tycos**" *Tips for Butter Makers*."

Taylor Instrument Companies

105 Ames Street, ROCHESTER, N. Y.

"Where the Thermometers come from"

Some Talk Dutch, Some Talk German

SOME TALK EITHER

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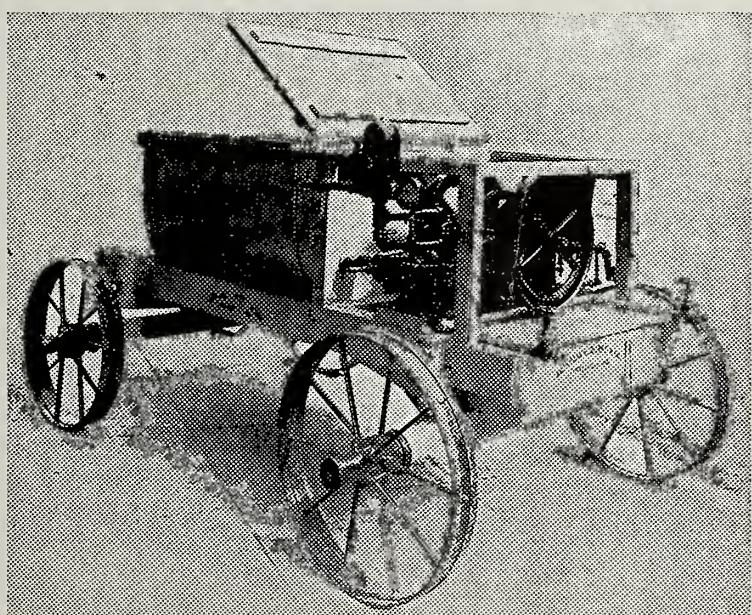
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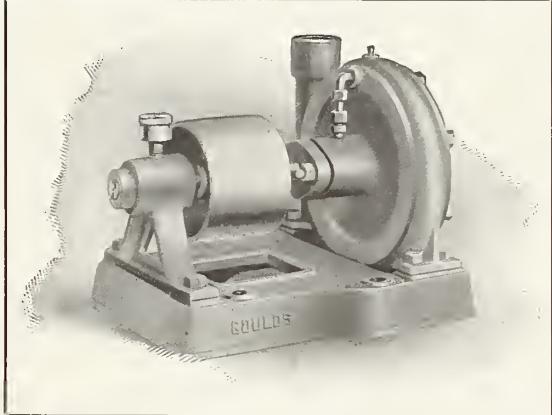
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Directions for Making Spraying Preparations

From Circular of Illinois State Experiment Station

SPRAY mixtures for the control of insects and fungi attacking plants may be divided into three principal classes, insecticides, fungicides and combined insecticides and fungicides. Insecticides are those sprays which are employed to control insects only; just as fungicides are for the control of fungous attacks. The two sprays are frequently combined in the same mixture to combat both insects and fungi. Insecticides are grouped into two classes, according to the method that is employed in combating the insect. First, for those insects which chew their food and can be killed by a poison which is taken into the stomach, a poison such as arsenate of lead or paris green is used. Second, for those insects which suck their food from the plant a spray is used which will corrode their bodies or close the breathing pores. These are known as contact sprays. Among the principal chewing insects with which the horticulturist has to deal are the following: Codling moth, canker worm, curculio, leaf skeletonizer, tent caterpillar, fall web worm, grasshopper, Colorado potato beetle; and for these insects arsenate of lead or paris green may be used. White hellebore is preferable for the following insects when the fruits are nearly ripe: Currant worms, cabbage worms, caterpillars and other insects attacking vegetables and small fruits. The use of arsenate of lead early in the season is recommended for all these insects, and white hellebore is used just before the ripening of fruit.

Arsenate of Lead: Commercial—Two pounds arsenate of lead, 50 gallons of water. Home-made—Ten ounces arsenate of soda, 24 ounces acetate of lead, 50 gallons of water.

The commercial arsenate of lead is prepared for spraying simply by mixing it with water to make a smooth paste and adding this to the water in the spray tank, thoroughly agitating the mixture when adding the paste. The use of a barrel churn or a large sized egg beater in a round-bottomed kettle will assist in the rapid preparation of the paste. Arsenate of lead may be made at home at a slightly less cost. For 50 gallons of diluted spray take 10 ounces arsenate of soda and dissolve this in a gallon of water (preferably hot) and in another gallon of water dissolve the acetate of lead. When completely dissolved pour the two simultaneously into the mixing tub containing the rest of the fifty gallons of water; stir well and the spray is ready. The use of wooden vessels is advised in handling these solutions. If desired the chemicals can be dissolved sep-

January 11, 1912, "Better Fruit" received 222 subscriptions by mail, coming from all parts of the United States.

arately and kept as stock solutions, and the arsenate of lead prepared as needed. For example, 31 pounds 4 ounces arsenate of soda dissolved in 50 gallons of water by suspending it at the top of the barrel in a coarse sack, and 75 pounds acetate of lead similarly dissolved in 50 gallons of water and thoroughly mixed will give solutions containing sufficient material so that one gallon of each added to 48 gallons of water will give the strength mentioned in the formula. The main difficulty with the home-made arsenate of lead is that the chemicals used are apt to be of varying strength. The arsenate of soda is often adulterated with salt. In purchasing supplies of these materials it is

Features of this Issue

DIRECTIONS FOR MAKING SPRAYING PREPARATIONS

THREE DESTRUCTIVE SNOUT BEETLES THAT ATTACK APPLES

USE OF SOAP TO RETARD SETTLING OF CERTAIN ARSENICALS

THE PEAR THRIPS

SPRAYING TABLE FOR 1912

A PLEA FOR NUT TREES FOR OUR HIGHWAYS

TWO ARTICLES ON THE PEDIGREE TREE

and foliage less, is practically insoluble in water and therefore may be used at almost excessive strengths without serious injury to most foliage. It is very adhesive and is not as readily washed from the trees as paris green. Properly prepared arsenate of lead, owing to its fine particles, remains in suspension longer and is capable of more uniform distribution. Paris green is the stronger poison, and while the same amount of poison will cost more in arsenate of lead the latter is desirable in orchard work.

Paris Green: Four ounces paris green, 1 pound lump lime, 50 gallons water.

Slake the lime carefully in a small quantity of water. When completely slaked add sufficient water to make a milky paste. Pour this through a fine strainer into the spray barrel or tank containing water sufficient to make fifty gallons. Mix the four ounces of paris green with a small quantity of water and pour into the lime and water mixture through a strainer. The paris green may be more readily and thoroughly mixed with the water if the two be placed in a bottle or jar and violently shaken for a few seconds before being added to the liquid in the spray tank. Thorough and constant agitation of the mixture during its application is necessary, as paris green settles to the bottom of the tank in a few minutes if the preparation is left standing.

White Hellebore: One pound white hellebore, 50 gallons water; or, 1 ounce white hellebore, 3 gallons water.

Mix the hellebore with a small quantity of water and pour into the spray tank containing the required amount of water. White hellebore may also be applied as a dust spray by mixing with five to ten parts of flour or road dust, and with this dust the plants when the dew is on, either early in the morning or late in the evening. White hellebore loses its strength very rapidly when exposed to the air, and should be kept in air-tight receptacles. Material carried over from one year to the next is liable to be of little value.

For those insects which obtain their food by sucking the plant juices the poisons used for chewing insects are of little value. Insects of this class require a spray which will corrode their bodies or stop their breathing pores. The efficiency of these sprays depends very largely upon the thoroughness of application, for the insect to be killed must be covered with the spray material. This class of sprays is intended for such insects as plant lice and other soft bodied sucking insects; among these are green apple aphid,

well to get a statement of the quantities required to secure complete combination. Two pounds of the commercial arsenate of lead, or the home-made (when prepared according to the above formula), will prove effective for the usual sprayings, but when results are desired at once or the attack of the insects is very severe three or more pounds can be used. For stone fruits, in addition to the two-pound strength, the use of two or three pounds of well slaked lime is advised. Arsenate of lead is preferable to paris green as an arsenical spray, for it generally contains less free arsenic, injures the fruit

woolly aphis, pear tree psylla, cherry aphis, such young scale insects as the oyster-shell, bark-louse, San Jose scale, scurfy scale and mealy bug.

Lime and Sulphur: Home-made—Fifteen pounds lump lime, 15 pounds flour or flowers of sulphur, 50 gallons water. Commercial—There are many commercial preparations of lime and sulphur on the market and as the composition varies with the manufacturer it is impossible to recommend any particular dilution, but in all cases the directions on the packages should be followed.

The method of preparation of the home-made lime and sulphur wash is taken from a circular on "Practical Treatment for the San Jose Scale," prepared by Dr. S. A. Forbes, state entomologist. "Materials: 15 pounds of lime, 15 pounds sulphur and 50 gallons fairly soft water. For 50 gallons of the spray, heat 12 gallons of water in a forty-gallon iron kettle, mixing in the meantime, in a separate vessel, 15 pounds of sulphur with enough water to form a thin paste. Add this sulphur to the water in the kettle and bring the mixture to a temperature just below boiling; then add 15 pounds of best lump lime, keeping cold water at hand to use as the mixture threatens to boil over. After the lime is fully slaked boil for 40 minutes, with almost constant stirring, then strain into a 50-gallon spray tank and fill with water, which had better be warm, although cold water will do. To prepare 100 gallons of the spray at a time heat 20 gallons of water in the 40-gallon kettle, add 30 pounds of sulphur, previously reduced to a thin paste with water, and to this put 30 pounds of lime. Boil as before and dilute to 100 gallons. Steam will be found more convenient to cook with than direct heat. Solutions of lime and sulphur, which may be purchased ready for use, after dilution, may be substituted for the home-made preparation described above. Persons preparing or applying the spray should avoid getting it upon the bare hands or face as it is very caustic. The undiluted mixture should not be left in the kettle over night, as it is likely to harden and cake, and is then worthless. See that all barrels and apparatus are thoroughly cleaned before using the mixture in them, otherwise the nozzles are likely to clog. Thoroughly clean kettles, hose, barrels, pumps and all spraying apparatus when the work with this wash is over for the season. Use this wash on the trees after the leaves are off, preferably in the spring before the buds have commenced to open. Never use the wash on trees in leaf. Thoroughly coat the trees, being careful to cover the smaller twigs and branches and to get the mixture in all the forks and crevices."

Kerosene Emulsion: Half pound (chipped) hard soap or 1 pound whale-oil soap, 2 gallons kerosene, 1 gallon soft water. To be diluted with water according to strength desired.

The soap is cut into small pieces and dissolved in the soft water heated to boiling, then remove the water from the fire and add the kerosene to the hot mixture, churning it violently at the same time. Pumping the mixture back upon itself for five to ten minutes



Bordeaux Mixture properly and improperly prepared, after settling one hour

through a hand force pump is an excellent method of mixing the emulsion. Continue the pumping until a creamy combination is obtained which shows no free oil on its surface. This is a concentrated solution and must not be used on plants until further diluted as directed below. For application to apple and pear trees in foliage, for green apple aphis, wooly aphis, pear tree psylla, etc., dilute one gallon of the emulsion with nine gallons of water. For cherry, plum and peach trees and plants with tender foliage dilute with twelve gallons of water. For house plants dilute with fifteen gallons of water.

Whale-Oil Soap: One pound whale-oil soap, 8 gallons water.

Whale oil soap is purchased ready for use, and the spray mixture is prepared by dissolving the soap in boiling

water and diluting to the required strength. This spray, at the above strength, is excellent for plant lice or aphis. The disagreeable odor of whale oil soap makes it unsuitable for use as a remedy for pests on house plants.

A fungicide is a spray material which has for its active agent a chemical in which the spores of fungi cannot develop, and a medium to aid in uniform distribution of the chemical. An example of a fungicide is to be had in bordeaux mixture, in which copper is the active agent, with lime to neutralize effect and make it adhere to the foliage and water to distribute it over the tree. Fungicides are designed to prevent or control such fungi as apple scab, bitter rot, brown rot, black rot, mildew of the grape and gooseberry, tomato and strawberry rusts and other fungi of a

Continued on page 78

The Three Destructive Snout Beetles That Attack Apples

By Frederick E. Brook, West Virginia University Experiment Station

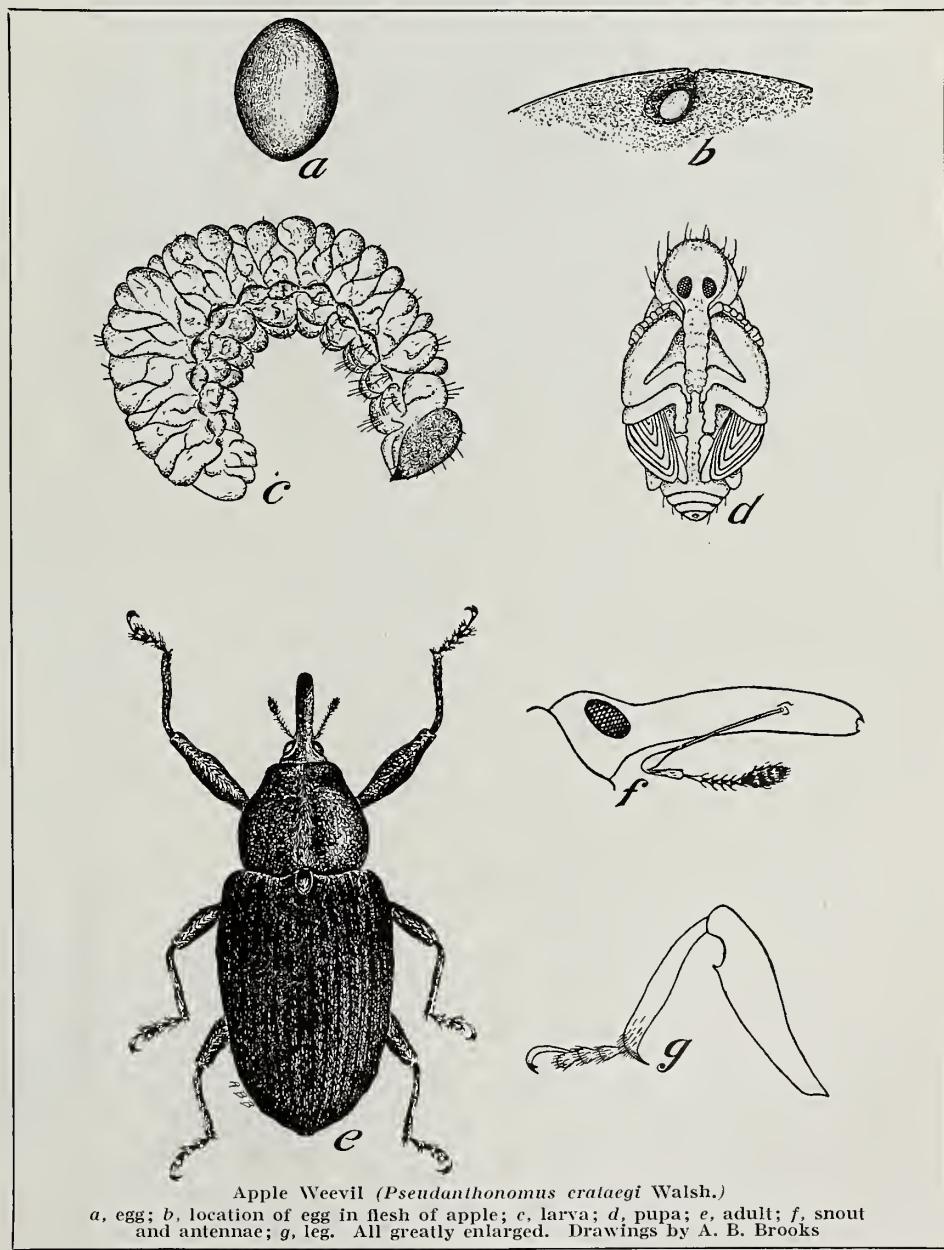
FOR several years knotty and wormy fruits have composed far too large a proportion of the apple crop in many parts of this state. Where spraying has not been practiced sound fruits have often been the exception rather than the rule, and in many cases almost the entire crop has been next to worthless. This condition has been largely due to the attacks of insects which took place during the growth of the apples on the trees. The insects responsible for most of the worm holes, scars and other malformations of the fruit are two species of small moths known as the codling moth and lesser apple-worm and three species of snout beetles. The injuries done by these five species are supplemented to some extent by the work of larger caterpillars, wasps and other insects, but the bulk of the trouble is usually due to the first mentioned species. This article will deal with the three snout beetles, two of which are familiar under the names "plum curculio" and "apple curculio," and the third, which is not so well known and which may be called the apple weevil, in the hope that it may aid the fruit grower to a clearer understanding of the habits of these insects and to a better knowledge of the possibilities of holding them in check in the orchard. Such a knowledge should assist in extending the practice of spraying, which at present is our surest and most practicable method of destroying these pests. The writer wishes to explain that in describing the habits and life histories of the apple curculio, and, to some extent also, those of the plum curculio, he has drawn freely from writings of other entomologists.

The plum curculio (*Conotrachelus nenuphar* Hbst.) is a snout beetle about one-fifth of an inch long. Its color is a mixture of black, brown and white, with the darker shades greatly predominating. On the back are several prominent humps which give the insect a roughened appearance and make it difficult to distinguish while on the tree from the bark or from a dry bud. It is armed with a curved snout one-third as long as the body. The insect is a native of this country and is distributed over practically all the United States east of the Rocky Mountains. Before orchards were planted within its range it undoubtedly fed and bred on wild plums, crabapples and hawthorns, but with the settlement of the country it turned its attention more to cultivated fruits, although it continues to breed on the wild, native varieties. It attacks plums, peaches, nectarines, apricots, cherries, apples, crabapples, pears, quinces and hawthorns, and has even been reported as breeding on persimmons. On account of the usual abundance of the insect and the great variety of valuable fruits which it attacks, there is little doubt but that it has been rightfully designated as the

most destructive of all the insect enemies of the orchardist in this section of the country. It injures the fruit by puncturing holes through the skin with its snout both for the purpose of feeding and egg-laying. The feeding punctures may be made in apples at almost any time during the summer, but the egg punctures are made mostly while the apples are small. These wounds, and the subsequent feeding of the larvae which hatch from the eggs, cause the fruit to become dwarfed in size, lop-sided, knotty and otherwise misshapen.

For several years the plum curculio has been very abundant in this state, and was notably destructive to apples in the spring and summer of 1909. By the first of June the apples in many unsprayed orchards showed the marks of the curculio in practically every fruit. Some early ripening varieties, such as Yellow Transparent and Early

Harvest, were "stung" until the fruit was scarcely recognizable. On June 23 the writer counted the egg punctures in the fruit of three young York Imperial apple trees that had not been sprayed. The trees bore 210 apples which contained 1,229 "stings," or an average of five to the apple. Only ten of the fruits had escaped injury. The apples on these three trees did not appear to be injured more seriously than those borne by other trees in the same locality. Many complaints have recently come to the experiment station from various parts of the state in regard to injuries to apples by this insect. In the spring, a little before apple trees are in bloom, the beetles leave their hibernating quarters and seek the trees. At this time they feed rather sparingly on the expanding buds and young leaves, while at the same time mating is in progress. Plums and cherries are usually the first fruits





a. Plum curculio; b, apple curculio; c, apple weevil; d, e, plum curculios. a, b and c, natural size; d and e, enlarged



b



d



c



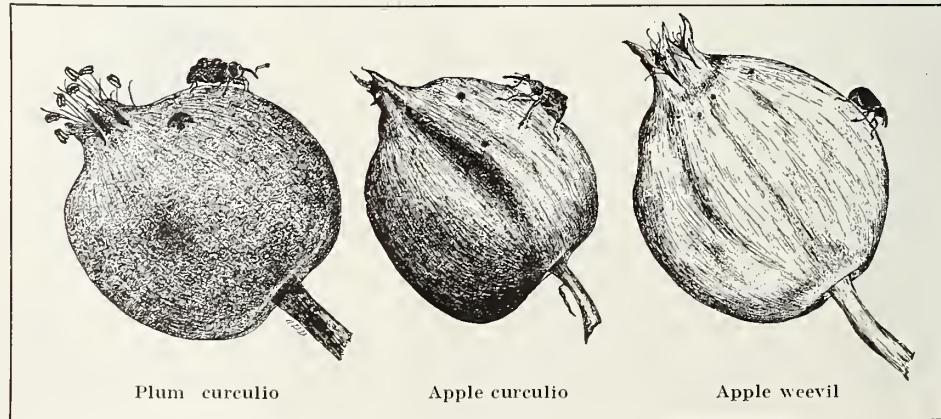
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attacked, but when apples are no larger than peas they begin to receive both egg punctures and feeding punctures. Egg-laying goes on rapidly through May and June, but after the first of July, as the old beetles die off, oviposition practically ceases. The eggs hatch in four or five days and the small, white larvae, or "worms," when they develop normally, feed on the fruit for from fifteen to twenty days, and then leave their food and enter the ground. A short distance below the surface the larva hollows out a small cell in the earth in which it transforms to a pupa and later changes to a beetle. The insects remain in the earth for a period of about a month and then emerge, as beetles, and resort to the trees. During the remaining days of warm weather the young beetles live on the trees, and often injure the fruit with their feeding punctures, but do not produce eggs the first season. With the approach of cold weather they leave the trees and hibernate. The following spring they emerge from their winter quarters, lay their quota of eggs and after the succeeding generation has been provided for by this means they die.

Details of Life History and Habits.—The minute egg of the plum curculio is oval in shape, and when first laid is pearly white, but it soon changes to a dingy, yellowish color. It is laid in a little pocket beneath the skin of the fruit which the female fashions with

her snout. After the egg is deposited in the pocket the beetle, beginning at the puncture already made through the skin, cuts a crescent-shaped mark partly surrounding the egg. The crescent marks are very conspicuous on smooth-skinned fruits, and may usually be found in great abundance by examining bearing apple or plum trees in May or June. The number of eggs that one female produces has been found by different entomologists to vary greatly, ranging from less than a hundred to 560 in one case. It is a safe estimate that the average individual produces 200 eggs. The eggs hatch in from three to seven days, according to temperature. In stone fruits, such as peach and plum, the larvae feed until full grown and then leave the fruit

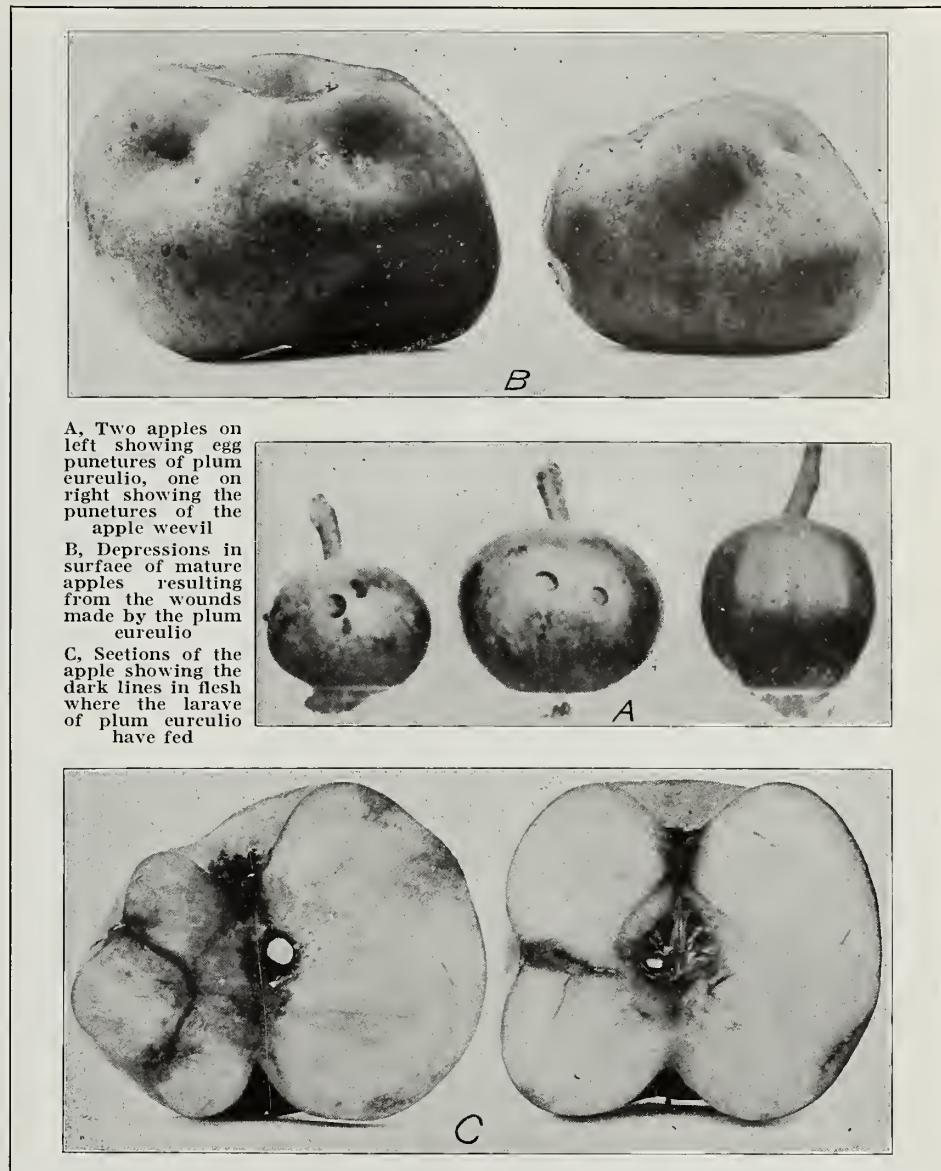
and enter the ground to a depth of one or two inches, where they transform to pupae and a little later to adult insects. In apples, for some reason that does not appear to have been fully explained, the larvae are not able to reach their full growth except when the infested fruit drops from the tree or stops growing soon after the larvae begin to feed. When the young curculio undertakes to develop within a vigorously growing apple it may feed for several days, boring its way from the skin toward the core, but it usually dies before the larval stage is half completed. Many of the wounds made by the beetle are outgrown, so that they can scarcely be seen in the ripe fruit. Frequently, however, the burrows made by the larvae show in the mature apples as dark-colored lines of hardened tissue, having a bitter taste. On the surface of the fruit the outer ends of these lines are usually marked by scars with sunken, and often rusty, areas about them. In the apples that drop the larvae develop normally, and, as many of the infested fruits fall to the ground, there would be an abundance of the beetles produced to perpetuate the species, even though there were no host plants but the apple. The pupa is a delicate white object, intermediate between the larva and the beetle, that occupies a cell in the ground, usually within two inches of the surface. The beetles mature and continue to emerge from the ground during quite a long period in the summer. After coming out they are at first somewhat sluggish, but they soon begin to feed on foliage and ungathered fruit. In apples they often make cavities of considerable size by repeatedly visiting one feeding place. The injury done to the fruit in this way is quite serious, since such wounds, whether small or large, disfigure the fruit and serve as centers for the spread of decay. As already stated, the beetles do not lay eggs the first season, but remain on the trees until warm weather is about over, and then hide away near the ground, under rubbish or in grass, or other material that will furnish protection, where they remain until the following spring. The fact that injury is always worse at points in the orchard near to woods, or to accumulations of trash, indicates that in the fall the insects



will go for some distance to seek such places to hibernate, and that they will resort to the most convenient trees when they emerge from hibernation in the spring. The fact also suggests that where possible such hiding places should not be allowed to exist in the vicinity of orchards.

The plum curculio has a number of natural enemies which attack it during the different stages of its existence. In several parts of the country a minute, hymenopterous insect, known scientifically as *Anaphes conotrachelii* Girault, has been found to live parasitically within the eggs and to destroy from sixteen to seventy per cent of all that are produced. Another four-winged parasite of the curculios, *Sigalphus curpulionis* Fitch, is quite common in West Virginia and has been repeatedly reared from the larvae of the plum curculio. The egg of this parasite is deposited in the fruit where the young curculio is feeding, and the larva from this egg attacks the immature curculio and destroys it before it transforms to a beetle. Ants of several species and the larvae of soldier beetles were observed in Upshur County, in 1908, to kill many of the curculio larvae after they had left the fruit and were seeking places to pupate in the ground.

The injuries done by the plum curculio are not so easily prevented as are those of some other insects, and yet there are a number of methods that can be used against them with a very satisfactory measure of success. In dealing with the insect on apples by far the most effective means of preventing loss is spraying with one of the arsenical poisons, such as paris green, or, preferably, arsenate of lead. Even where spraying is practiced, however, it is a good plan to use in connection with the operation some of the other measures suggested here if the best possible results are to be obtained. Jarring, as a method of dealing with the curculio consists of placing sheets of white cloth under the trees in the early morning and then jarring the insects from the branches to the sheets by striking the body of the tree a sharp blow with a padded mallet. The insects, being thus disturbed, "play 'possum," and can be collected from the sheets by hand or by shaking them into some receptacle. The sheets may be stretched on light frames of wood, so that they can be conveniently and rapidly moved from tree to tree by several persons working together. Another method is to attach the sheets to a hopper-shaped frame mounted on a two-wheeled cart made to push like a wheelbarrow. In making this catcher a slit should be made in the front part of the sheet so that the body of the tree can enter, in pushing the outfit into place. A can of kerosene may be arranged below an opening at the bottom of the hopper so as to catch the curculios that roll down the inclined sides. This method of killing the insects is open to some objection from the fact that a great many lady-



bugs and other beneficial species are destroyed along with the curculios. The jarring of the trees should be begun in the spring soon after the blossoms have disappeared, and should be continued every morning for four or five weeks, or for as long a time as many beetles are secured. In some experiments conducted by the writer on plum trees it was found profitable to continue the jarring for five weeks, though when practiced every morning for only three weeks decidedly beneficial results were obtained. This method of destroying the curculios is more practicable for plum and peach trees than for apple trees because of the fact that apple trees are often so large that it is a slow and laborious task to jar them effectively.

Cultivation of the soil under the trees during July and August breaks up the pupal cells and exposes the young curculios to the light, which is destructive to them, and to the attacks of predacious insects and birds. In this way many of them can be destroyed. In most of the apple orchards of West Virginia the trees are now being headed so low that it is impossible to cultivate directly beneath

the branches, which is necessary in order to destroy the young curculios by this method. However, the greater ease with which low-headed trees may be sprayed and the other advantages of this form of pruning probably much more than offset this one disadvantage. If the fruits of any of the varieties in which the curculio breeds are collected from the ground in June and July and burned or fed to hogs many of the insects will be destroyed. Infested fruits usually drop several days before the larvae within them are full grown, and by disposing of the drops the number of curculios that would compose the succeeding generation can be greatly curtailed.

The same poisons that are used as sprays on apple trees to destroy the codling moth are the ones most effective against the plum curculio. In dealing with either insect the first spray should be applied as soon after the blossoms have disappeared as possible. The spray should consist of from one to three pounds of arsenate of lead to fifty gallons of water, or, where bordeaux mixture is used, the same amount of arsenate of lead to fifty gallons of the mixture. This



Plum and apple curculio. Enlarged



Photo by W. E. Rumsey

method of dealing with the plum curculio has given good results in many different states and is a well tried and safe remedy. In some experiments conducted by this station in Berkeley and Upshur Counties in 1909, it was found that one pound of arsenate of lead to fifty gallons of water, when applied to the trees just after the petals had fallen, through a bordeaux nozzle at a pressure of from 180 to 250 pounds, gave practically the same results against the curculio as the stronger mist sprays when applied oftener at a lower pressure. By spraying in the two ways mentioned above, Mr. W. E. Rumsey, of the experiment station, in an orchard in Berkeley County, reduced the curculio punctures in apples with a single high-pressure spray from 32 per cent to 12.5 per cent, and with four mist sprays from 32 per cent to 13.9 per cent. The writer, after using the two methods of spraying as described above in an orchard of fifty young York Imperial apple trees in Upshur County, found that on June 23, after practically all the curculio eggs had been deposited, 95.4 per cent of the unsprayed apples contained egg punctures, 41 per cent of those treated but once, with the high-pressure spray, contained egg punctures and 40 per cent of those sprayed four times with the mist sprays contained egg punctures. This experiment showed an advantage of the sprayed over the unsprayed fruit of about 55 per cent. A similar saving of the fruit by spraying has been accomplished in many other tests and experiments in this state and in other states.

The Apple Curculio (*Anthonomus quadrigibbus* Say) has often been confused with the plum curculio, but in reality it is quite distinct from that species in both appearance and habits. The apple curculio is more reddish-brown in color, the form is more

robust and on the back are four prominent humps, the front two of which are much larger than any of the humps on the back of the plum curculio. The snout of the apple curculio is almost as long as the rest of the body, or three times the length of that of the other species. This snout is carried projecting forward instead of hanging down like an elephant's trunk, as is the case with the plum curculio. In attacking the fruit the apple curculio bores through the skin in a manner similar to that of the other species, but after the puncture is completed and the egg laid only an indistinct speck is left on the surface to mark the place of injury, whereas the plum curculio makes the conspicuous crescent-shaped mark. A glance at the insects or at their work is sufficient to enable anyone who is at all acquainted with the species, to distinguish between the two. The apple curculio is much less abundant and destructive in West Virginia than the other species.

The apple curculio is a native American species of wide distribution. It has been reported from Connecticut and Ontario south to North Carolina and westward as far as New Mexico. It seems to have been more troublesome in Missouri, Illinois and other Mid-Western States than elsewhere. The species was named and described by Thomas Say in the year 1831. Its life history was worked out in Missouri by C. V. Riley in 1870, and more thoroughly by Professor Charles S. Crandall of the Illinois Experiment Station in 1904. Its original food was the fruit of the thorn and wild crab, but as the settlement of the country has provided it with opportunities to attack cultivated apples it has turned its attention from time to time to these fruits and become a pest of considerable importance. The writer has found this curculio on apple, plum and wild crab at

French Creek, Upshur County, and on wild crab at Seebert, Pocohontas County. In both cases on the crab it was present in considerable numbers. While to our knowledge it has never been a pest of serious consequences to the apple in West Virginia, yet the fact that it breeds here, quite probably in considerable numbers in many parts of the state, together with the fact that it seems to be forming a liking for cultivated apples, should lead the fruit grower to regard it with suspicion and to do what he can to prevent its rapid multiplication. The fruits that the apple curculio has been recorded as attacking are the hawthorn, wild crab, haw, wild cherry, quince, pear and apple. Professor W. E. Britton reports that in one case the beetles injured peach trees in Connecticut by puncturing the twigs full of holes.

According to Riley and Crandall, the life history of the apple curculio is as follows: The beetles emerge from hibernation early in the spring, and soon after the blossoms disappear from the trees begin laying eggs in the young fruit. Egg laying extends over a period of about sixty days, and one female may produce something over one hundred eggs, but the average is only about sixty-five for each individual. The eggs hatch in about five days and the larvae therefrom feed on the flesh of the apple for about twenty days, when they reach full growth and transform to pupae within the fruit. After remaining in the pupa form for about a week they change to beetles and soon after leave the fruit. Unlike the plum curculio, the young beetles of this species do not appear to injure apples by feeding on them during the late summer and fall after their emergence. According to Crandall, by the first of August most of the beetles have disappeared from the trees, and after that date are found near the ground in

grass beds and among fallen leaves. Of about twenty-five specimens which the writer bred from crabapples at French Creek more than half the number did not leave the fruit until after August 10. It appears from this that if the young beetles go to the trees after they emerge from the fruit they may be found on the trees somewhat later in the season here than in Illinois.

The larva of the apple curculio is a wrinkled, footless, dingy white grub which, when full grown, is nearly half an inch in length. Some of the body segments in front of the middle are greatly enlarged on the back, which gives the larva a hump-backed appearance, and prevents it from straightening out as the larva of the plum curculio is able to do. The head is yellowish-brown, with the jaws dark brown. In feeding it ejects from the fruit a greater quantity of excrement than is thrown out by the larva of the plum curculio. The ejected castings are reddish-brown in color, and often adhere to the skin of the fruit in conspicuous masses like those seen about the burrows of the codling worm.

Injury is done to the fruit by the beetles, which drill pits into the flesh for feeding and for the reception of eggs, and by the larvae which feed and undergo their full development within the fruit. The feeding punctures made by the beetles extend directly into the fruit to a depth of .08 inch. The egg punctures are similar, but are considerably enlarged at the inner end where the egg is located. After the female has deposited her egg in a puncture she seals the opening through the skin with a bit of excrement which becomes hard when dry, and probably excludes enemies that would attack the egg.

The writer reared one hymenopterous parasite (a natural enemy of the curculio) from wild crabapples infested with larvae of the apple curculio which were collected at French Creek. The adult insect appeared in the breeding jar in which the crabapples were kept on August 18, 1909. Through the kindness of Dr. L. O. Howard it was determined for me by Mr. H. L. Viereck of the Bureau of Entomology as *Pristomeridagilis* (Cress).

Where the apple curculio becomes troublesome care should be taken that no thickets of wild crab or hawthorn are allowed to remain as breeding places near the orchards. Such thickets may produce thousands of the beetles, and when the wild fruit becomes insufficient for the great number of beetles they may seek places to feed and oviposit in cultivated orchards. The jarring method, as recommended for the plum curculio, is effective when used against this species. Spraying with poisons is likely to be beneficial, but it is probable that not as many of the beetles will be killed by the operation as in the case of the plum curculio, for the reason that in feeding they consume little of the exposed surface to which the poison is applied.

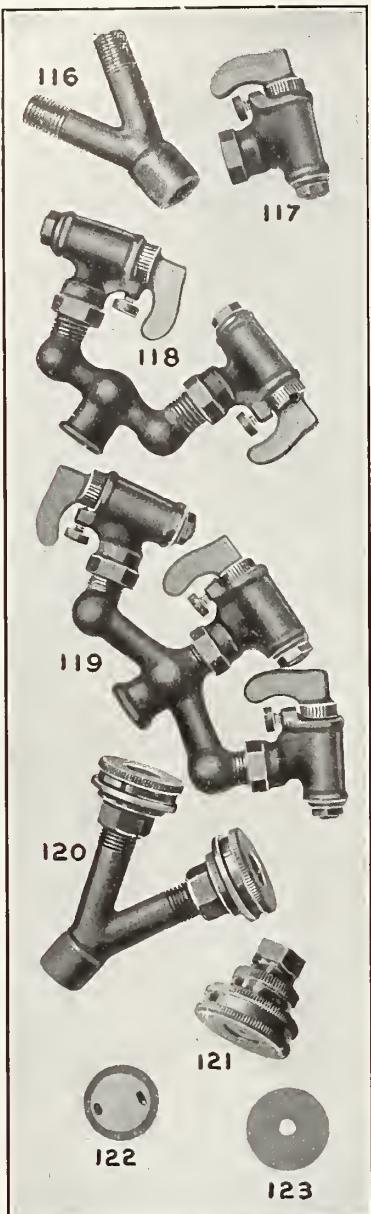
The Apple Weevil (*Pseudanthonomus crataegi* Wash.).—In making observations on the extent of injury that was being done to apples by the plum and apple curculios during the spring and summer of 1909 it was noticed that another small snout beetle was present on the trees and was doing considerable damage to the young fruit. The insect was not recognized at first, and specimens were forwarded to the specialists in Washington, who identified them as belonging to the species whose

technical name is given above. The species does not appear to have attracted attention previously as an enemy of apples, but according to observations made by the writer the habit of breeding in this fruit seems so well fixed that the common name of "apple weevil" is suggested as being suitable. The first instance that came under our notice in which apples were attacked by this insect was in June, 1907, when Mr. W. E. Rumsey, of this department, saw one of the beetles lay its egg in an apple growing on the Experimental Station Farm at Morgantown. In the spring of 1909 Mr. Rumsey also saw numerous punctures in young apples in Berkeley County which he attributed to this species. At French Creek, in Upshur County, the beetles were abundant on apple trees during the past summer (1909), and in some cases almost every fruit on unsprayed trees showed the punctures of the insect. Very little has been written in regard to the feeding habits of this insect. It was bred from Cecidomyid galls on *crataegus* (hawthorn) by Benjamin Walsh in Illinois, and was described and named by him in 1866. There are a few brief records of the adults having been collected from flowers, where they may have been feeding on pollen. LeConte gives its distribution as Middle, Western and Southern States to Texas. (Rhynchopora of N. A. p. 205.) A. D. Hopkins collected the beetle in Monongalia County, West Virginia, in June, 1893.

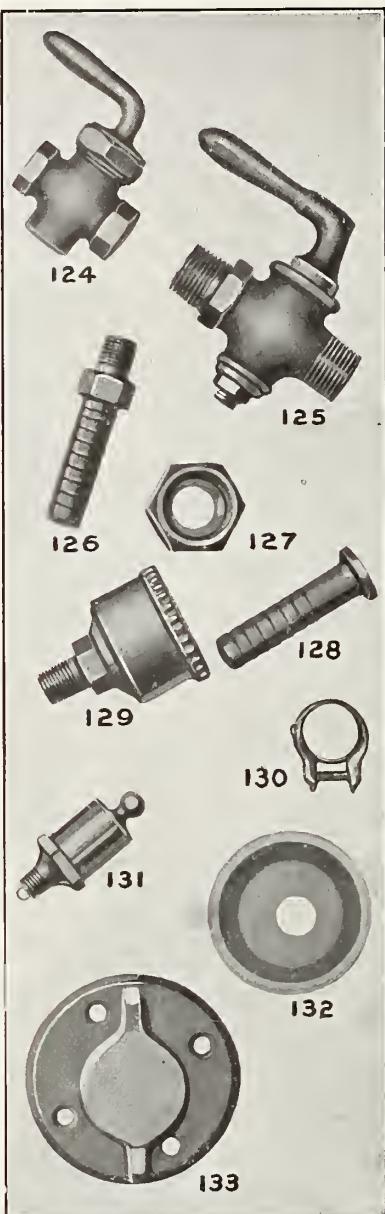
The apple weevil is a small, elongated beetle, measuring one-tenth of an inch in length, exclusive of the snout, which is a little less than half as long as the body. The snout and prothorax are finely and densely punctured and the



Spraying scene in North Yakima Valley, Washington



116, Brass "Y," designed so that two nozzles can be used on one line of hose, with $\frac{1}{4}$ -inch pipe thread on butt, and fits our Vapo or Bordeaux nozzles; 117, Single Bordeaux nozzle; the name of this nozzle is misleading; it is not intended for spraying bordeaux mixture only, but will handle any of the spraying chemicals; 118, Two-cluster Bordeaux; 119, Three-cluster Bordeaux; 120, Two-cluster Vapo; this nozzle throws a fine spray, not so fine as the Vermorel, but much finer than the Bordeaux; 121, Single Vapo, a larger nozzle than those used in the two-cluster Vapo; 122, Brass disc for Vapo nozzle; 123, Steel disc for Vapo nozzles.



124, "Leakless" stopcock; 125, Special brass stopcock, fitted at one end with $\frac{1}{2}$ -inch pipe thread and at the other end for standard hose thread (will fit nut on $\frac{3}{8}$, $\frac{1}{2}$ or $\frac{5}{8}$ -inch hose); 126, Male end of high pressure hose coupling; 127, Hose nut, fits $\frac{3}{8}$ and $\frac{1}{2}$ -inch hose; 128, Tail pipe of high pressure hose couplings; 129, Brass compression grease cup, $\frac{1}{4}$ -inch pipe thread; 130, Sherman hose clamp; 131, Brass spring top oil cup, $\frac{1}{8}$ -inch pipe thread; 132, Rubber drip guards for use on bamboo rods; 133, Brass emptying flange, with screw top, used for draining barrel or tank.

wing covers deeply striated. The beetle is a uniform sepia brown throughout, with a sparse covering of short, yellowish hairs, particularly noticeable along the upper part of the prothorax, where they form a more or less distinct longitudinal, dorsal line. This species may be distinguished very readily from either of the curculios described in this article by its much smaller size, lighter and browner color and the absence of humps on the back. The beetles emerge from hibernation early in the spring, and toward the last of May begin to lay eggs in young apples. On May 28 the writer saw the beetles engaged in

oviposition, and found the eggs abundant in two varieties of sweet apples and somewhat less abundant in several varieties of more acid fruits in a neglected apple orchard at French Creek. In this orchard egg laying continued until near the last of June, and soon after that time all the beetles of the over-wintering generation disappeared and oviposition ceased. In addition to observations made in the orchard a number of beetles were kept in breeding jars, as nearly as possible in a natural temperature, and their habits noted. The last egg obtained from the beetles in the jars was laid on

June 24 and the last of the beetles died on July 8. Early in July the beetles of the second generation began to appear. The first adult of this generation was seen to emerge, with slight assistance, from an infested apple on July 7, one day before the last of the old generation passed away. By July 25 beetles from the early laid eggs were appearing in the breeding jars in considerable numbers, though the last individual of them did not leave the apple until August 30. The period during which the beetles were emerging seemed to be considerably longer than the period of oviposition. This was due to the great variation in the length of time required by the different individuals to complete their transformation. A difference of several weeks in this respect was noticed in the individuals which developed from eggs laid by a single female during one day in one apple. The young beetles, after appearing in July and August, spend the remaining portion of warm weather about the trees, and when cool weather approaches they hibernate, presumably beneath scales of bark and in other sheltered places in and near the orchards. No evidence could be found that these young beetles lay eggs the first season. Twenty-five such beetles were kept in confinement from about the first of August until the first of November. These beetles were supplied with apples at all times, but there was no sign of oviposition. A close watch of the insects on the trees also aided in the conclusion that there is but one generation produced annually.

As has already been stated, the beetles feed on the young fruit. This they do by making minute punctures through the skin and then eating all the flesh of the apple that can be reached with the snout through the opening. As the apples increase in size the individuals of both generations feed in the open wounds made by larger insects. They also feed on decayed fruit. A limited portion of their food is obtained from the leaves by scraping fragments of the tissue from the upper surface. The beetles were seen engaged in this manner of feeding on the trees and those kept in confinement riddled the apple leaves with which they were supplied with small holes. From an economic standpoint this habit of attacking the leaves is important, for it brings the species more readily within the reach of arsenical poisons. When the beetles are disturbed by the shaking of the branch on which they are resting, or the sudden and near approach of some object that alarms them, they have a habit of raising the front part of the body by extending the forelegs and at the same time elevating the snout so that it points directly forward instead of hanging down. After assuming this pose they will sometimes remain rigid and motionless for several minutes. It usually requires a somewhat violent jar to dislodge them from their position on a branch.

Continued on page 73

The Pear Thrips, Destructive Pest of Deciduous Fruit Trees

By Dudley Moulton, Inspector United States Department of Agriculture

THIS paper brings together the results of an investigation of the life history, habits, natural enemies and methods of control of the pear thrips (*Euthrips pyri* Daniel), a pest of deciduous fruit trees in the San Francisco Bay region of California. The investigation was undertaken at the request of the Santa Clara County Board of Supervisors, who furnished the funds and liberally granted necessary facilities for a thorough and scientific study, and was carried out in the Santa Clara Valley, where the thrips seemed to be at its worst. The investigation extended through a period of fifteen months, from February, 1904, to April, 1905. The writer offers this article rather as an introduction for future work than as a completed account, and it is intended especially for the fruit grower, that he may understand the nature of the insect and its injury. The alarm felt for the safety of the deciduous fruit industry, which the pear thrips caused during 1904 and 1905, in the light of our present knowledge, need not again be experienced, and, although no effective means of control are yet offered, a knowledge of the life habits should do much to clear away the uncertainty usually following the first appearance of a destructive pest in any locality.

The pear thrips is known to exist in the San Francisco Bay counties and along the Sierra Nevada foothills, but it is not known how widely the pest is distributed outside of these localities. It is still a question whether the insect is a native of California or an introduced form. The pear thrips may have had some indigenous plant, such as the wild plum or cherry, for its original food plant, and later, as large fruit growing districts were developed and as the insect found more and better food, it may have changed its feeding habits from the wild to the cultivated plants. This would be a not unusual change. On the other hand, it may have been imported and, finding conditions favorable here and no effective natural enemies present, may have increased and spread rapidly. In 1904 the pest was thought to be strictly local in the Santa Clara Valley, but in 1905, when the insect had become better known, it was found to be widespread in the San Francisco Bay regions, and its ravages were being felt in fruit sections in other than this one valley. A peculiar blighting of blossoms had been commonly observed in several localities in the Santa Clara Valley previous to 1904, and this blighting was invariably followed by an almost complete failure of crop. Its cause was not at first explained, for trees were injured within a very few days and the insects, as it happened, were gone before the owner was aware of the injury.

The pear thrips seems to have reached a maximum in numbers during the season of 1905. Large orchard sections,

often miles in length, suffered an almost complete failure of crops, and the worst infested areas were in the heart of the best fruit sections of the valley. All of this loss, however, cannot be charged to thrips, for there occurred unusually heavy and driving rains during the blossoming season of that year, and it was often impossible to determine the relative amount of injury caused by the thrips and that caused by rain, except where thrips were found feeding before the storms came on. The season of 1906 proved to be a more hopeful one. Thrips, fewer in numbers, were late to appear, and the early injury to buds was not so

apparent. The trees blossomed almost in the normal way. The later injury to fruits, however, was quite as noticeable. The scab on mature prunes—the never failing evidence that thrips have been feeding in the spring—depreciated the value of the fruit in all of the thrips infested regions.

Injury to plants is the direct result of the feeding and ovipositing of the thrips. The mouth parts of thrips project from the lower posterior side of the head and have the appearance of an inverted cone (Figure 1). The mouth opening is in the small distal end, and through it the stylets or piercing organs are projected when the

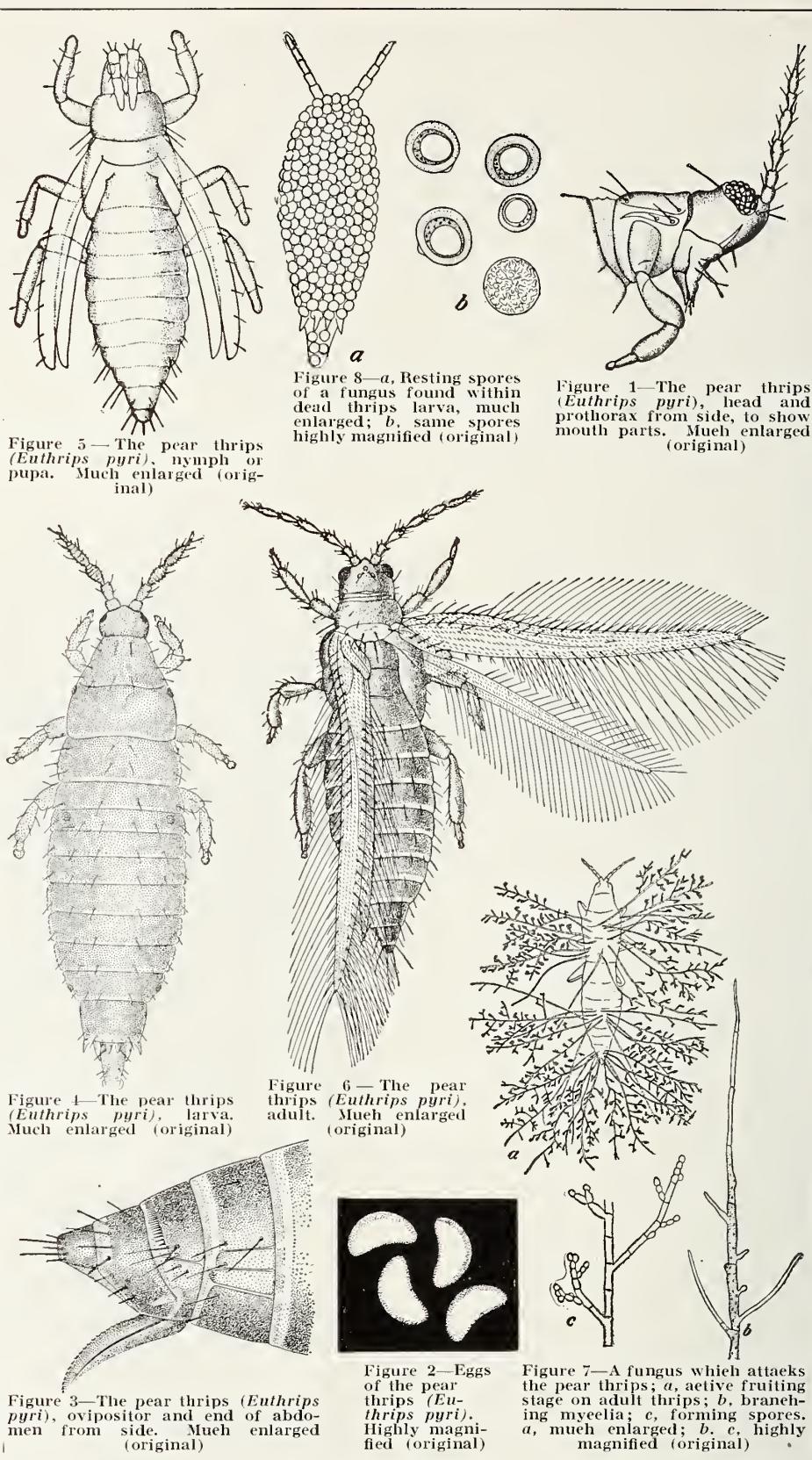


Plate I—Work of the Pear Thrips (*Euthrips pyri* Daniel)
 Figure 1—Imperial prune showing buds and blossoms injured by feeding of adult thrips. Figure 2—Unfolding leaves of Hemskirk apricot injured by young thrips. Figure 3—Madeline pear showing cup-shaped deformities of the larger and rolling of the smaller leaves, the injury caused by young thrips. (Original.)

insect is feeding. The rim at the tip is armed with several strong, chitinous points, which figure prominently in tearing open the plant tissues. The insect first pierces the plant epidermis with the stylets, then, moving the cone tip backward and forward, it enlarges the opening and lacerates the plant tissue by means of the barbed snout. It then pushes the tip of the mouth cone into the puncture thus made and sucks in the plant juices. Larvae feed in a similar way, having similarly constructed mouth parts.

The dark brown adult thrips arrive on the trees in late February and early March, the period of early opening buds and first blossoms; they are common in March and April, the two months of bloom and early leaf, and all are gone from the trees by the middle of May. Only a few adults can be found after the first of May, and most larvae have reached full growth by this time and have gone into the ground. Thus it is that the active feeding stages of the thrips coincide with the budding, blooming and early leaf periods of the host trees. The difference in bud formation and progress of development of various deciduous trees influence to a large extent the manner of injury which thrips inflict. Trees may be divided for the sake of convenience, in regard to the bud structure, into two groups, namely: (1) Those in which a single fruit bud produces one blossom, such as the almond, apricot and peach; and (2) those in which a single fruit bud opens out to form a cluster of blossoms, which later produces a cluster of fruits, as the prune, cherry, pear and apple.

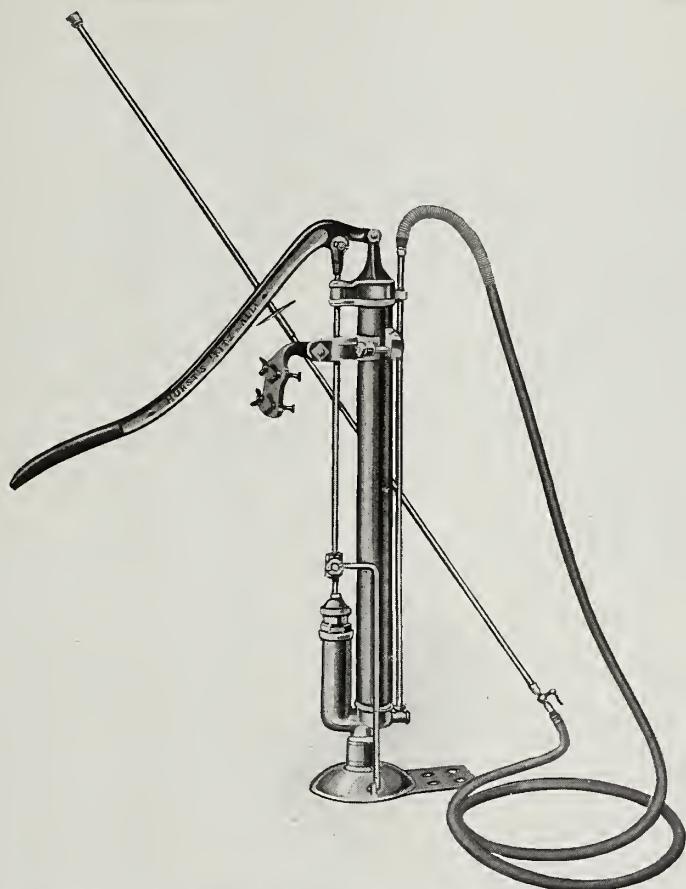
The relative blooming periods of the several varieties of fruit on which thrips inflict injury, as found in the Santa Clara Valley, may be noted as follows: Group 1, almonds late in February, apricots and peaches early in March. Group 2, prunes middle and last of March, cherries and pears early in April. These periods vary from year to year, and the varieties of each fruit also vary to a large degree, but the general order of blooming is suggestive. Opening buds precede full bloom by eight or ten days. The almond, of the first group, presents an interesting study of the feeding habits of thrips. The bud development occurs during early February, early blossoms from February 5 to 16, and full bloom from February 9 to 20 and later. Thrips appear about February 25 or March 1, and it is evident that almond blossoms are well along before enough thrips have appeared to become especially injurious. Many instances can be cited where thrips were especially numerous on almond trees, often as many as twenty-five or fifty inhabiting a single blossom, and yet the trees set and matured a full crop of nuts. The insects did not have an opportunity to attack the opening buds, and after blossoms were open they preferred the nectary glands on the inside of the calyx cups. Apparently they did not relish any other parts of these particular bloss-



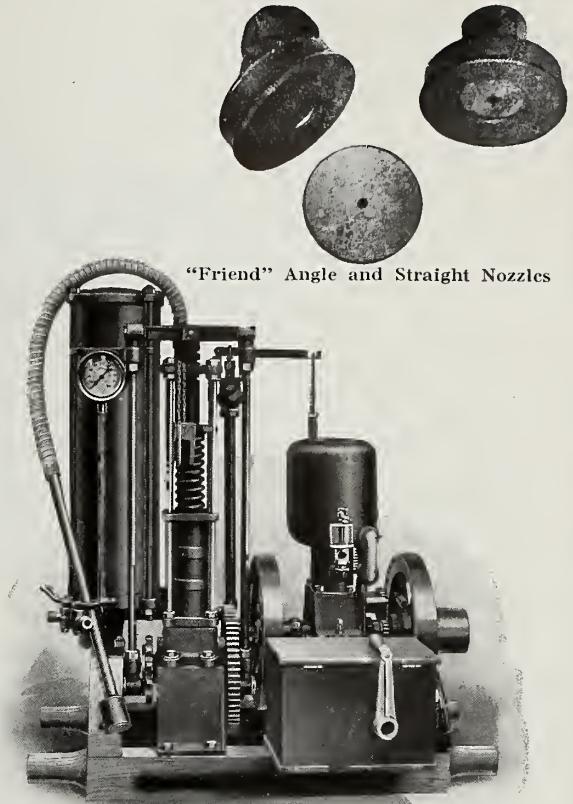
soms, and the pistil, stigma and young fruits were not attacked. Stamens were weakened, for they arise from the rim of the calyx just above the place where the insects find their enticing food, but the pollen had already ripened and had been shed. Thrips can be found as numerously on almonds as on any other variety of affected trees, but there is a large, newly exposed leaf and blossom sur-

face, and the greatest danger period is passed before the insects arrive. For these reasons the trees are able to support many thrips without the amount or the quality of their fruit being appreciably affected.

The peach, especially the Muir and the Nicols' cling varieties, suffers as much as other fruits, but the acreage in the Santa Clara Valley is not large as compared with that of the prune, for



The Hurst Fitz-All Barrel Sprayer, manufactured by the H. L. Hurst Manufacturing Co., Canton, Ohio



The Bean Magic Pony Outfit, showing the Bean Magic hand pump connected to a sprayer engine. Any grower can buy the engine equipment when he is ready to convert his Magic into a power sprayer. Manufactured by the Bean Sprayer Pump Company, San Jose, California

instance, consequently the damage has not been so marked. The period of opening buds and blossoms occurs just at a time to permit of thrips entering them from their earliest development. The swelling bud pushes apart its outer winter protecting scales and thrips immediately force a way in. The insects feed on the tender, closely plaited tips of petals, which are readily killed. They force an entrance between calyx lobes and petals, feeding as they go, and soon reach and attack the very small and fragile blossom stem. This is soon destroyed. Later the blossoms which may have escaped the early injury are attacked from within, the thrips feeding on the inner flower parts. The piercing and rasping manner of feeding is very disastrous to tender plant tissue, and fatal injury can be effected by a very few movements of the powerful mouth cone with its armed tip. The writer has often examined peach trees which had but recently been attacked by thrips and found that almost every blossom would fall out from its cluster of scales when the limbs were gently tapped. Badly infested peach trees do not bloom at all. Apricot blossoms are similar to those of the peach and are injured in the same way.

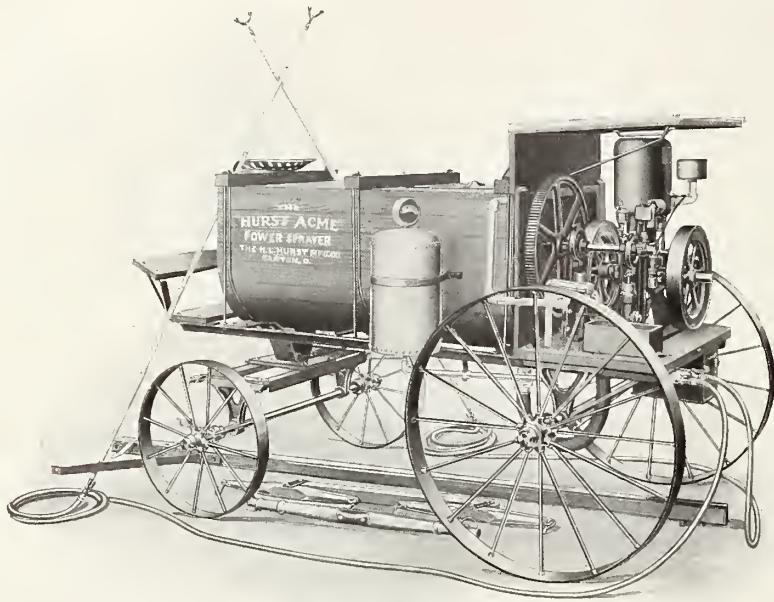
The thrips is at its worst on trees of the second group, which includes the pear, prune, cherry and apple. These fruits bloom later, which permits the gathering of thrips in numbers before buds are at all advanced. The writer

has found thrips on cherry and prune trees waiting, as it were, for the buds to open, and he has found as many as seventy-five individuals in a single blossom which opened prematurely. A thrips enters a prune bud through the tip and forces a way down the center of the cluster, feeding as it goes on the contiguous sides of the several blossom buds. Normal growth ceases immediately. The untouched outer side of each blossom bud develops for a time, but the injured inner part becomes brown and dies. This causes each flower bud to turn in toward the center, and the whole cluster eventually falls. (See Plate I, Figure 1.) When thus injured most blossoms do not open at all, but if they do thrips are able to enter and feed in the more vital flower parts. Only a few blossoms survive both periods of injury when thrips are very numerous. The insects attack blossom and leaf buds alike, and in fact every part that offers new and tender plant tissue. Pears suffer mostly during early bud development, and blossoms are nearly all dead before the clusters open. Cherries present a more resistant growth. There is a decidedly sticky secretion on the surface of newly exposed leaves, and often wings of thrips stick fast, and many are thus trapped. Cherries develop so rapidly that when buds once start blossom clusters are able to push out, often almost unharmed, even when many thrips are present. These clusters form ideal places for oviposition, and, as will be

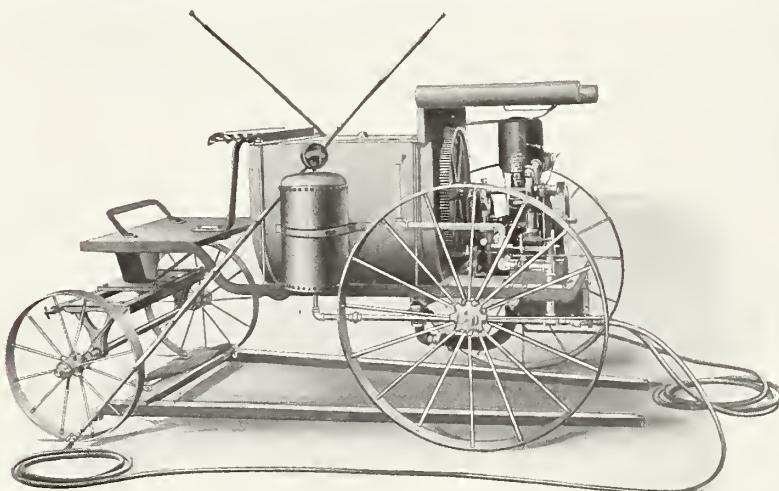
seen later, cherry trees, which may be able to resist the early injuries of feeding will suffer from the effects of ovipositing.

Thrips have displayed very decided preferences for certain flower parts. It has been mentioned that they choose the inner side of the almond caylx cup. In prunes they are partial to the tiny blossom stems and to the tips of petals, and, when blossoms have opened, to the stigma and style. This last injury is especially noticeable on cherries, where the writer has many times found the stigmas and styles blackened as a result of the feeding of thrips, while the rest of the blossoms were untouched. Injury on leaf buds and on tender foliage is almost as marked as when blossoms alone are attacked, although there can be no closely drawn line of distinction because of the close inter relation of leaf and blossom buds. Trees that have been ravaged for three or four days cannot again put forth new leaf buds and assume a natural growth for several months, and then they appear sickly for the entire year. Often they cannot start anew until the thrips have actually left the trees, as the insects continue to hinder each new effort which the trees may make.

The pear thrips is known to feed on the following plants, and it is probable that the list, extensive as it is, is not complete: Almond, apple, apricot (several varieties), cherry, fig, grape, peach (Muir and Nicols' clings pre-



The Hurst Acme Power Sprayer. Special features: Short-turn gear, large capacity, light weight, high pressure, automatic pressure regulator, cyclone agitator and a never failing engine. The engine can be removed from the sprayer by simply loosening four bolts, and the engine can then be used for general farm work. Manufactured by H. L. Hurst Manufacturing Co., Canton, Ohio



The Hurst Pony Acme Power Sprayer for hillside and one-horse work. This sprayer was designed primarily for hilly orchard work, where the heavy machines cannot be used, but it has found a ready sale among small fruit growers who desire a sprayer that can be drawn by one horse on level land. Manufactured by H. L. Hurst Manufacturing Co., Canton, Ohio

ferred), pear (especially Doyne du Comice and Bartlett), plum, prune, walnut (English). The insect shows a decided preference for certain varieties of prunes, pears and peaches, but of the other fruits all varieties seem to be attacked alike. The pear thrips has been collected from the following indigenous plants: Blossoms of the madrona (*Arbutus menziesii*) and wild California lilac (*Ceanothus thyrsiflorus*) and foliage of poison oak (*Rhus diversiloba*). All of these plants, however, were located near thrips infested orchards, and, moreover, only a few individuals were taken from each of the plants.

Thrips larvae feed almost entirely on young, tender foliage and on the surface of fruits. They conceal themselves in terminal buds (Plate I, Figure 2), and often, as on the cherry, they attack the under side of leaves, usually near the prominent veins. They cause

the leaves to become much contorted, ragged and full of holes. The insects seem at times to take advantage of certain tendencies in the growth of plants on which they happen to feed. For example, newly opening pear or apple leaves show a tendency to roll from the sides inward, and thrips find this inner protected surface a most desirable feeding place. In such a case the upper, inner surface is destroyed, and the leaf, instead of opening out, becomes rolled up tight and eventually dies. The insect thus secures the tenderest of leaf tissue for its food, and also protection in the folded leaf. (Plate I, Figure 2.) Thrips often cause a deadening of the leaf margin, and in such cases the leaf is forced into an abnormal, often cup shaped, growth. This is a very characteristic injury on pear trees. (Plate I, Figure 3.) The feeding injury of thrips larvae on fruits, especially prunes, is in a way

superficial, but it seriously impairs the appearance of the ripened fruits and greatly lessens the value of the finished product. A prune grows to be larger than a grain of wheat before the dead calyx is sloughed off. Larvae feed under protection of this dead calyx, and as a result an abrasion of the skin, the feeding injury, is noticeable, even on very small fruits. The wound appears first as a small brown spot, which enlarges and produces a scab as the fruit matures. The seriousness of what at first might seem a small surface marking is more readily appreciated when one recalls that when prunes are being cured the tough, scabby spot does not shrivel up during the process of drying as does the flesh of the prune, nor does it assume a darker color as does the prune. Thrips larvae are often carried by various means from the original food plant to other hosts, being blown, for example, from a tree to grass or weeds beneath. They have no wings and cannot fly back to the tree. A few crawl up again, but most larvae adapt themselves to the new plant until fully grown, when they, too, go into the ground. Many of the common weeds have thus been found supporting larvae, although no full-grown thrips have ever been seen feeding or depositing eggs on such plants. The insect has proved itself a strictly fruit tree pest, and it is carried to weeds and lives on them or on other plants only by accident.

The thrips egg is bean shaped (Figure 2), light colored, almost transparent and is very large in proportion to the size of the abdomen when seen within the body of the adult female. It is about 0.33 mm. long by actual measurement. The ovipositor (Figure 3) is made up of four distinct plates. Each plate is pointed, has a serrate outer edge and is operated by powerful muscles and plates within the abdomen. The pairs on each side fit together along the inner edges with a tongue and groove like structure, which, in action, renders possible a sliding back and forth or sawing motion. The ovipositor is protected within a sheath in the ventral tip of the abdomen when not used, but before and during ovipositing it is lowered until almost at right angles to the body. Oviposition accompanies feeding. It seems necessary, indeed, that before the ovipositor can be inserted through the plant epidermis the thrips must first weaken or break an opening through this tissue with the mouth parts. The successive operations of lacerating the plant tissue, lowering the ovipositor, placing an egg and withdrawing the ovipositor require from four to ten minutes, and may be briefly described as follows: After making an incision with the mouth parts the insect moves forward, lowers and inserts the ovipositor and by operating the tiny saws she makes a deep incision in the plant tissue. While the ovipositor is still deeply set in the plant an egg is conducted through the cavity between



The Hardie Triplex Power Sprayer

A machine which does your work economically, thoroughly and rapidly. It is well constructed on sound mechanical principles. This machine is used by thousands of orchardists, and is free from experimental risks

the plates and deposited underneath the epidermis. The ovipositor is withdrawn and the egg is thus left deeply imbedded within the plant. During the oviposition period one often finds a branch or a tree, or even many trees, on which almost all thrips are ovipositing at the same time.

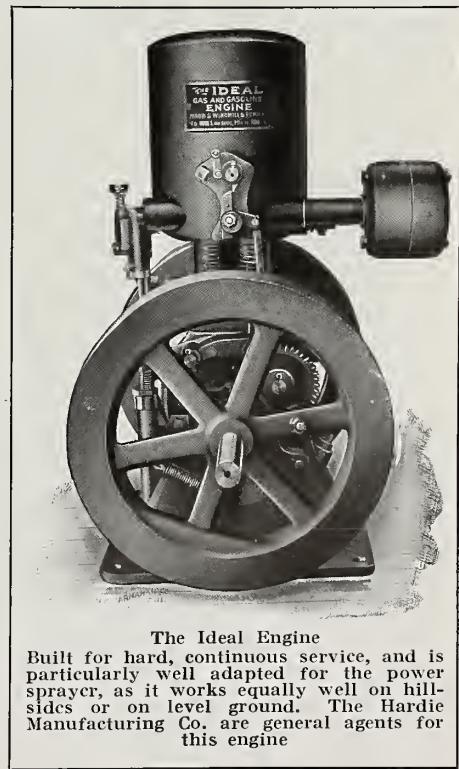
The small, fragile, just exposed blossoms, stems and leaf petioles, and later the midribs and veins on the back side of the leaves, and still later even the leaf tissue itself, are the places preferred for ovipositing. A thrips always places her eggs in the tenderest of the plant's tissue. There is danger of the ovipositor getting caught if the tissue is hard. It is also necessary during egg development that the surrounding tissue be flexible and moist, for the egg covering is elastic and the embryonic thrips within increases in size very noticeably before the larvae issues. There is space within the adult insect's body for only a few eggs at a time—seven or eight. A thrips probably places only a few eggs during a single day. She feeds for a time, deposits an egg and then moves to another place, and later to still other places, and these may be all on one or scattered on several trees. The adult thus spreads her progeny from tree to tree wherever she goes. Nothing seems to hinder thrips which may be set on ovipositing. They have been observed placing eggs at all hours of the day and night, and under all conditions of weather. The period of oviposition lasts for several weeks, or during practically all of the life of the adult insects. Injury from oviposition is most conspicuous on cherry trees. Operating at the base of a cluster of fruits, a few thrips will cut several incisions and place as many eggs in a single stem. This so weakens the stem that it fails to perform its usual function, and the rapidly developing cherry soon becomes yellow and falls. Thrips seem to prefer the cherry to other varieties of fruits as a place for ovipositing during the later season, and

this fruit suffers severely from ovipositing, though it may escape the first feeding injury. The result is a heavy dropping of half-grown cherries, which in badly infested regions means almost the whole crop. Numerous leaf and blossom stems in which eggs had been placed were closely watched to determine the length of the egg stage. In many cases these stems became dry during confinement in the laboratory, and almost invariably from these no thrips issued. Eggs need moisture for their preservation and development, and young thrips must have tender and pliable tissue through which to emerge. The egg stage lasts approximately four days.

It is interesting to watch, with the aid of a long lens, a young thrips issuing from the egg. The tiny incision in the stem of a blossom or leaf shows where an egg has been placed, and the enlarging egg within, causing a swelling in the plant tissue at the summit of which is the incision, indicates that the insect is about ready to emerge. The first sign of life is the appearance, pushing out from the incision, of the head with its bright red eyes. Little by little, and swaying backward and forward, the larva forces itself out until about one-half of the body is exposed, when first the antennae and then one by one the pairs of legs are made free from their resting position against the body. Swaying backward and forward, with legs and antennae waving frantically about, the insect pushes out of the egg cavity almost to its full length, whereupon, leaning forward, it eagerly takes a hold with its newly formed feet, and with a final effort pulls itself free and walks rapidly away. From four to ten minutes are required for the insect to free itself from the egg. The young insect is almost transparent and the green chlorophyll particles taken into the stomach can be seen through the body wall. Growth is rapid from the beginning. A very decided change takes

place during the second larval stage (Figure 4). In about three weeks the insect reaches a size often larger than that of the fully matured insect. It then ceases to feed, falls to the ground and enters the ground by some crack or worm hole. It goes down from three to ten inches, according to the structure and condition of the soil, the usual depth being about four inches. Upon reaching a secure depth, the larva hollows out for itself a tiny spherical or oblong cell, or it finds an exceedingly small natural cavity and shapes this for its convenience. The completed chamber has a hard, smooth inner wall, and it is about one-twelfth of an inch long, or just a little longer than the insect itself. The insect here spends the greater portion of its life. It remains for several months a quiescent, non-food-taking larva. Later the pupal changes are undergone, and lastly the adult insect appears before it issues forth to the tree. Larvae collected from the ground on August 28 were active, and, strange to say, green chlorophyll matter, undigested food, which had been taken into the stomach several months before, was still present in their bodies. The insects are scattered through the soil from near the trunk to several feet from the tree.

The writer has not been able to determine how long the nymph stage (Figure 5) lasts, but it evidently extends over several weeks. Nymphs in all stages of development were collected during May and at intervals until the following February, but they are most common during December, January and February. The writer has gathered nymphs from the ground early in May, but it is difficult to explain their presence there so early in the spring. It hardly seems possible that these were the still immature



The Ideal Engine

Built for hard, continuous service, and is particularly well adapted for the power sprayer, as it works equally well on hillsides or on level ground. The Hardie Manufacturing Co. are general agents for this engine

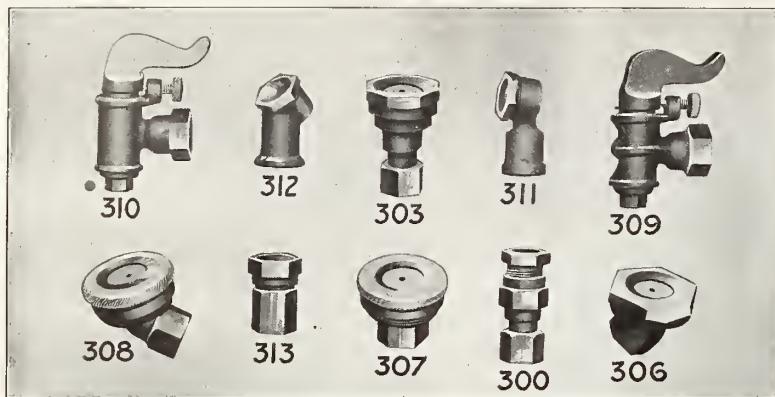
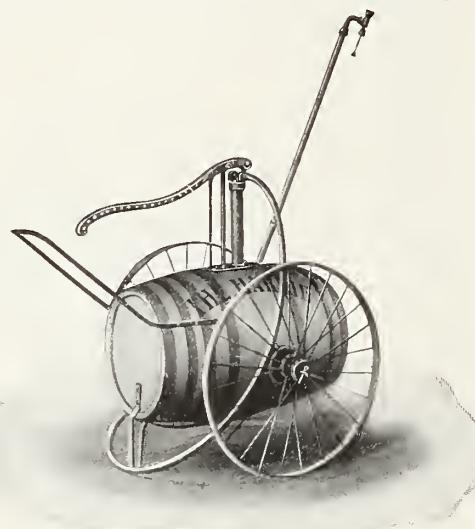


Illustration showing Bean Spray Nozzles, manufactured by the Bean Spray Pump Company, San Jose, California

forms of the previous year, for by this time all adult thrips had left the trees. These nymphs were taken along with the larvae, which had just entered the ground, and it might seem that they were hurrying through to produce a second generation; but to the writer's certain knowledge adults of a second generation did not appear on the trees. The nymph is active at all times. Wings develop from mere buds to long sacs which project backward along the sides of the body, and eventually reach beyond the tip of the abdomen.

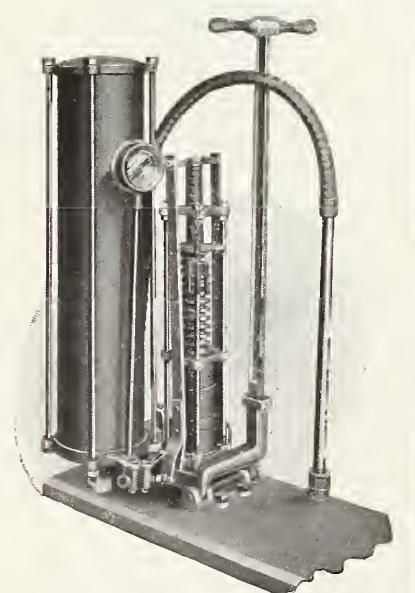
The adult thrips (Figure 6) remain in the pupal chamber for days, and it may even be weeks before they issue forth to take up active life. How individual thrips force their way through the several inches of earth which lies above them is still a question. They come out, it seems, only after the ground has been thoroughly softened by rains, and it is evident, too, that they depend largely on the natural openings. They cannot possibly use the backwardly bent mouth cone as a means of boring or biting their way out. They have several groups of spines and certain angular edges on the

sides of the abdominal segments, however, which might be used in forcing a way through the soft soil. They also possess roughened, scoop-like structures—parts of the chitinous, hoof-like shell of the feet—which undoubtedly are used for digging. Adult thrips appeared in alarming



A wheel outfit for the small fruit grower and gardener

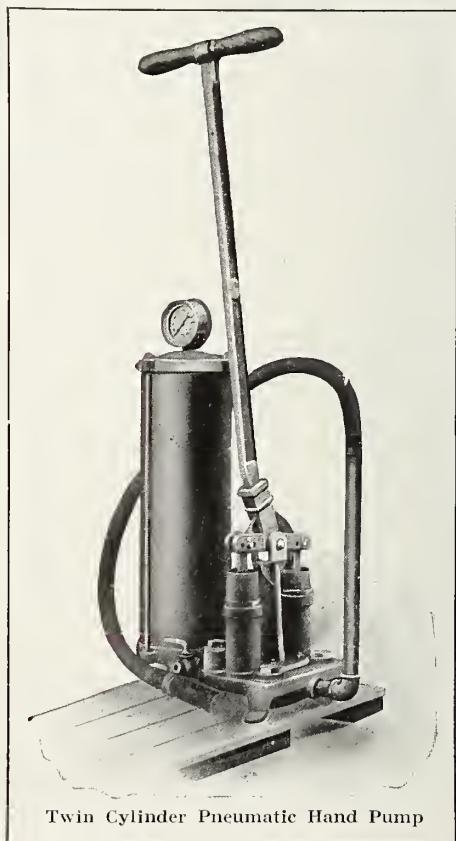
numbers in many Santa Clara Valley orchards in 1904, about February 24; in 1905 several days later, and in 1906 about March 1. They appear on the trees by millions and, it seems, all at about the same time. They feed and oviposit most actively during March and April, and by May 1 almost all have disappeared. No male individuals of the pear thrips have ever been collected; all have been females. Adults may be present in an orchard for a few days and then suddenly almost all disappear. This is explained by their habits of migration, as evidenced by the following observations: In a certain pear orchard which had been kept under daily observation for a week or more thrips had been abundant in blossoms and buds until suddenly one day all seemed to have disappeared. Upon closer examination, however, they were found congregating and walking around on the larger branches. This was about 3 o'clock in the afternoon. On the following morning hardly an



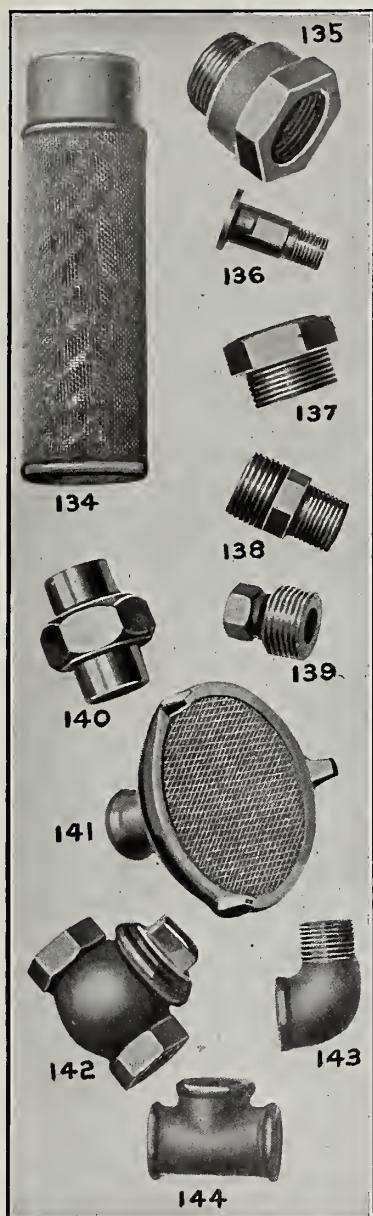
The Bean Magic Hand Sprayer
Manufactured by the Bean Spray Pump
Co., San Jose, California

individual could be found in the orchard. This manner of flight seems to be distinctly migratory. Thrips often leave their places of feeding just before sunset and hover around and over and later settle back on the same trees. This mode of flight is decidedly different from the migratory one. It occurs only at evening, and the writer has never seen the pear thrips in flight during the morning or during the middle of the day.

Description of *Euthrips pyri* Daniel.—Measurements: Head, length 0.13 mm., width 0.15 mm.; prothorax, length 0.13 mm., width 0.2 mm.; mesothorax, width 0.28 mm.; abdomen, width 0.31 mm.; total length 1.26 mm. Antennae 0.31 mm. Color dark brown, tarsi light brown to yellow. Head slightly wider than long, cheeks arched, anterior margin angular, back of head transversely striate and bearing a few minute spines and a pair of very long prominent spines between posterior ocello. Eyes prominent, oval in outline, black with light borders, coarsely faceted and pilose. Ocelli are approximate, yellow, margined inwardly with orange-brown crescents, posterior ones approximate to but not contiguous with light inner borders of eyes. Mouth-cone pointed, tipped with black; maxillary palpi three-segmented; labial palpi two-segmented, basal segment very short. Antennae eight-segmented, about two and one-half times as long as head, uniform brown except segment 3, which is light brown; spines pale; a forked sense cone on dorsal side of segment 3, with a similar one on ventral side of segment 4. Prothorax about as long but wider than head; a weak spine at each anterior and two large, strong ones on each posterior angle; other spines are



Twin Cylinder Pneumatic Hand Pump



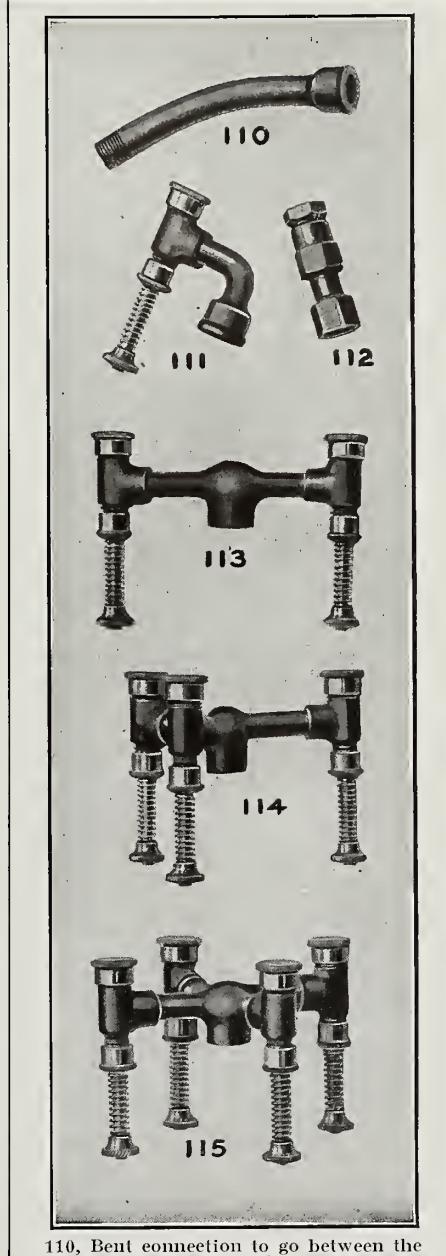
134, Malleable iron strainer with brass wire cloth; 135, Brass bushing, 1-inch female pipe to 1-inch male hose; 136, 3/4-inch threaded tail pipe; 137, Brass bushing, 3/4-inch female pipe to 1-inch male hose; 138, Brass bushing, 1/2-inch male pipe to 3/4-inch male hose; 139, Brass bushing, 1/2-inch female pipe to 3/4-inch male hose; 140, 1/2-inch brass union; 141, Brass strainer; fits 1-inch suction hose; has projecting legs to keep the screen of the bottom of tank; 142, 1/2-inch brass ball check valve, made especially heavy for high pressure; 143, 1/2-inch brass street ell; 144, 1/2-inch brass tee.

not conspicuous. Mesothorax with sides evenly convex, angles rounded; metanotal plate with four spines near front edge, inner pair largest. The mesonotal and metanotal plates are faintly striate. Legs moderately long, uniform brown except tibiae and tarsi, which are yellow. Spines on tip of fore and middle tibiae weak; several strong spines on hind tibiae. Wings present, extending beyond tip of abdomen, about twelve times as long as wide, pointed at tips; costa of fore wings thickly set with from twenty-nine to thirty-three quite long spines; fore vein with twelve or fifteen

arranged in two groups of three and six, respectively, on basal half of wing and a few scattering ones on distal part; hind vein with fifteen or sixteen regularly placed spines; costal fringe on fore wing about twice as long as costal spines. Abdomen subovate, tapering abruptly toward the tip from the eighth segment; longest spines on segments 9 and 10; abdomen uniform brown, connective tissue yellow. Redescribed from many specimens, including several cotypes from Miss Daniel. Male unknown. Food plants, apricots, apples, almonds, cherries, figs, grapes, pears, prunes, plums, walnuts. The insect is found mostly on deciduous fruits. Habitat, San Francisco Bay region, California.

The study of the life habits of the pear thrips, as already given in detail, explains why certain artificial remedies are not entirely effective, and it also suggests other methods. Adults appear suddenly in late February and early March. They enter the opening buds and feed largely in protected places, and always on newly developing plant tissue. Destruction to buds can be accomplished in a very few days—it may be in less than a week. The fully developed wings of the insect permit of active flight and widespread distribution. Oviposition, extending through several weeks, permits of a widespread and a continuous feeding period for the new brood. Eggs are safely placed within the plant tissue. Larvae feed largely in protected places while on the tree, and then seek shelter and spend many months in the ground. An individual of the species will spend about eleven months in the ground and one on the tree, although the whole period of infestation of trees by adults and larvae may be about three months.

Exposed thrips, both adults and larvae, can be killed by several of the contact insecticides, but sprays have not proved successful because the spray mixture cannot be forced into the very tender buds and blossoms where the thrips are without injuring the plants; and, besides, all of the thrips cannot be reached by a single spraying. It was found in the limited experiments of 1905 that thrips could be killed over any given area, but that within a few days the infestation would be as bad as though no spraying had been done. This is accounted for by the presence of those thrips which escaped the spray and by the new individuals which had migrated into the orchard. It would be impossible for all persons to accomplish their spraying within the few days when the thrips are arriving on the trees. Larvae are more easily killed than adult thrips, but as they feed largely within the leaf clusters they, too, are protected. Spraying to kill larvae would necessarily be done after the serious injury from adults had been effected. It might be possible to obtain some results by applying a poisonous spray, but the ever newly unfolding leaf surface, upon which the insects could



110, Bent connection to go between the extension rod and nozzle, so as to carry the nozzle at an angle of about 45 degrees from the rod; 111, Single Vermorel nozzle, the best type for making a fine spray; 112, Cyclone nozzle, a favorite for spraying cold water paint and whitewash; 113, Two-cluster Vermorel; 114, Three-cluster Vermorel; 115, Four-cluster Vermorel.

feed and which would not be poisoned, would render this kind of spray almost useless.

There is some ground for believing, although the evidence is not conclusive, that thorough cultivation will figure largely as a means of control for the pear thrips; but even here the treatment must cover areas of considerable extent. Thrips larvae in the ground are mostly within reach of the plow, being usually found within five inches of the surface, although a few may go deeper. On uncultivated areas they may be found within two or three inches of the surface. Thrips are entering the ground mostly during the last two weeks of March and during April, a period when the most active cultivation of the year is carried on.

Continued on page 60



Methow Valley District Exhibit at St. Paul Land Products Show, December 12 to 23, 1911. Arranged by Furey-Culver Co., Carlton, Washington, and awarded the sweepstakes cup of St. Paul Association of Commerce for the best ten boxes of apples and varieties grown in the American Northwest

The Land Product Show at St. Paul

THE St. Paul Land Products Show was a great success not only in attendance but in bringing together the people of the Pacific Coast States with those of the Middle West. To the people of the Twin Cities, as well as the farmers of the Middle West, the products, especially apples, from our Western States were a revelation. From an educational standpoint the St. Paul Land Show will go down in history as being the best ever held. The different state exhibits, as well as the sectional exhibits from the several states, were representative of what could best be produced in each state or district. Washington and Oregon, especially the former, were well represented. The Washington state exhibit, collected and installed by Mr. and Mrs. Wessel of Spokane, was awarded first prize for being the most artistic state exhibit, and certainly was the most attractive exhibit of the entire show. The Great Northern and Northern Pacific Railways vied with each other in showing the best of everything in the way of fruits, grains and grasses grown along their respective lines. A large portion of the Great Northern space was devoted to apples and processed fruits from their Washington territory.

The State of Washington again demonstrated its superiority as an apple growing state by securing the sweepstakes cup offered by the St. Paul Association of Commerce for the best ten boxes of apples and varieties grown in the American Northwest. This contest was the most spirited of the entire show, as the different fruit growing sections of Montana, Idaho, Washington and Oregon were represented by district exhibits, all anxious to win the sweepstakes cup for their particular

state and district. The Methow Valley district exhibit, made by Furey-Culver Company of Carlton, Washington, was awarded this sweepstakes cup for the best ten boxes of apples and varieties grown in the American Northwest. This, in connection with the awards to the apple growers of this valley at the National Apple Show of 1910, demonstrated it to be not only the scenic valley of the state, but one of the best apple growing sections as well.

That spirit of hearty co-operation between the different states and different sections of each state manifested throughout the entire show spells success so far as united action for more settlers for the West is concerned. The people of Illinois, Wisconsin, Iowa, Minnesota and the two Dakotas have

had an opportunity to see what we of Montana, Idaho, Washington and Oregon can produce; they are interested in what we have to offer the homeseeker and investor, and if the good work started at the St. Paul show is followed up by good systematic work by our different Western publicity agencies the Pacific Coast States are bound to reap a rich harvest in the way of new settlers and the right class of investors. Too much praise cannot be given President L. W. Hill of the Great Northern Railway for the personal interest he has shown in the St. Paul Land Products Show. Largely through his efforts the different states and districts were induced to make exhibits, and we do not believe there is a single exhibitor who but feels himself indebted to President Hill for some of the many courtesies extended to all exhibitors while at the land show. The business men of St. Paul certainly gave all the glad hand and made us feel we were among friends who were directly interested in the settlement and development of the Pacific Northwest. The Twin Cities are the natural gateway to the Northwest. As that section develops and prospers so will their cities increase as manufacturing and distributing centers. We leave St. Paul feeling we have made good in our efforts to interest settlers and investors in the Northwest. We believe all exhibitors feel they are well repaid for expense incurred in making exhibits, and are returning to their different localities hoping they may have the privilege of attending the second Northwestern Land Products Show under the same management at Minneapolis in 1912, with a larger and better exhibit.—Exhibitor.

Editor Better Fruit:

Enclosed please find check for one dollar for renewal of "Better Fruit." I could not possibly do without it. It improves every number. I only wish there was something in it for the green orchardist—the new beginner. All the articles are advanced and for advanced fruit growers. However, it is a daisy. Yours very truly, J. Watson, Beaumont Realty Company, Los Angeles.



Great Northern Railway Exhibit at St. Paul Land Products Show, December 12 to 23, 1911

Improve Your Fruit by Growing Pedigree Trees

By Joseph Moncrief, Winfield, Kansas

A NUMBER of years ago, in the study of botany, when I came to the statement that plants, like animals, had sex, the idea came to me of improving all plants by breeding up, just as is done in animal life. In the last fifteen years I have been in the nursery business and have become thoroughly

going on all around us in almost every line, of birds, animals, flowers, etc., nothing was being done to improve the fruit of the tree. Think of it, a tree is planted for from twenty to fifty years, while livestock to be butchered in just a few years was receiving the very best of attention.

In taking this matter up with a number of other nurserymen I became convinced that the fault did not lie with them alone, but with the planters as well, who almost universally asked the price of trees when making a purchase and cared nothing for the quality. Believing that the old nursery propagating was altogether wrong and more than one hundred years back, I determined to make some examinations in this line or get out of the business. Up to this time I had been growing trees such as other nurserymen, aiming to grow good stock, selling wholesale what we had in surplus and buying of other nurserymen what we were short. Another very bad thing from the planter's standpoint was the fact that in the old line of nursery business the scions or twigs, as the grower would understand it, from the scion tree were propagated were almost universally cut from the nursery row, or, even worse, poor trees which were unsalable and had to be lined out in order for clearing the scion orchard. By this method you could readily see that a large per cent of grafts were made from watery sprouts, which progressive horticulturists understand at once, usually take from three to four years to mature fruit buds; thus a large per cent of the ordinary nursery stock, especially in apple, was three or four years longer coming into bearing than it should be

under scientific methods. We then began observations in bearing orchards of all kinds of fruit and found that in the best orchards there was a large number of barren trees, or trees which annually bore poor fruit. Most any orchardist, if you will call his attention to the subject, will tell you that he has observed a certain Ben Davis or a certain Winesap which bore much better than the others. The law of "like begets like" has been well established; then why not propagate trees from this best Ben Davis, which you know is fruitful, rather than by the old methods of propagating from the nursery row without knowing whether you are getting fruitful trees or barren ones.

Following out this idea we began to select scions and buds from trees of superior merit, and our results are most satisfying; our orchards come into bearing earlier than other trees, besides getting very satisfactory trees when it came to hardiness. We have kept improving this system until now we are growing pedigreed trees, and this year had 225,000 two-year-old apples in our nurseries of which we could give you the pedigree, just as a livestock dealer gives you the pedigree of his hogs and cattle. As an example, we quote you the description of two or three apples as follows: Jonathan (A): Age of tree 7 years, height 18 feet, spread 14 feet, diameter of trunk 8 inches; fruit very highly colored, dark red; produced six boxes of fancy fruit; fruiting habits for three years regular; first prize winner in Denver National Apple Show. Rome Beauty: Age of tree 9 years, height of tree 12 feet, spread 20 feet, diameter of trunk 8 inches; fruit highly striped with red; produced ten boxes choice fruit; orchard bearing three years. W. W. Pearmain: Age of tree 10 years, height 20 feet, spread 20 feet, diameter

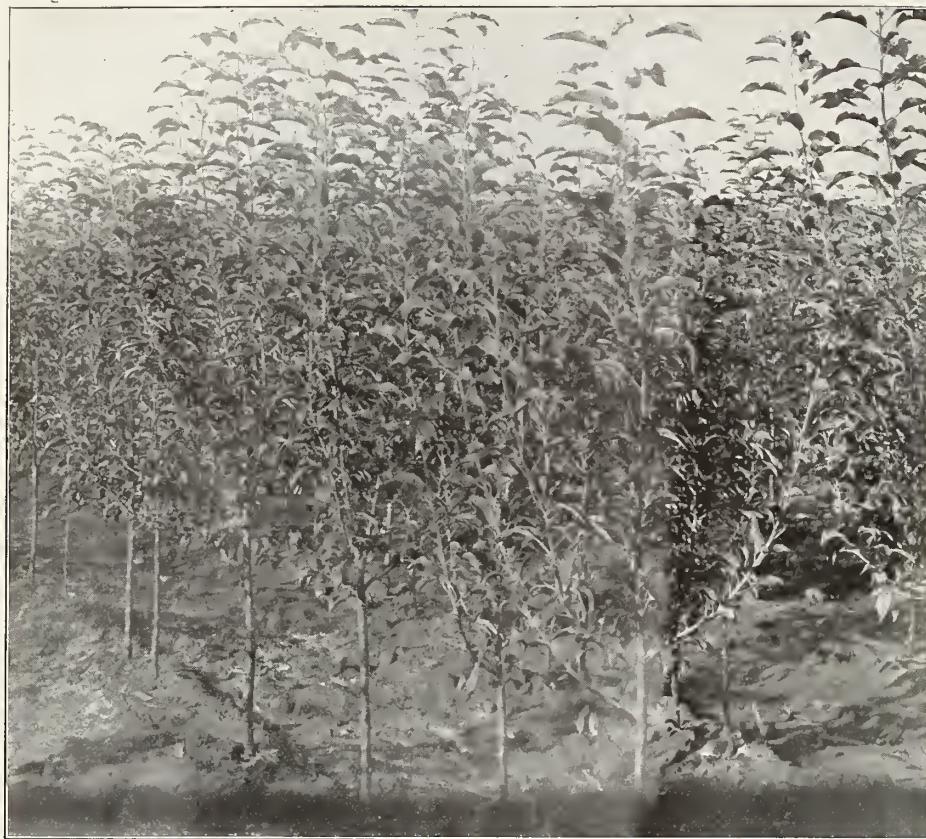


J. Moncrief, President of the Winfield Nursery Company

dissatisfied with the old rut that the ordinary nursery business was in, viz, propagating trees by the cheapest methods, without knowing anything whatever of the parentage of the trees and without regard for growing trees to bear fine fruit and large quantities of it. I also became attracted to the work of Mr. Burbank in California and the wonderful things he was doing in the originating of new varieties both by selecting seedlings and scions which, you might say, he originated and proved able of getting desired effects and valuable new varieties by hybridizing or breeding. I also note that the only tendency in the old nursery line seems to take up and boom new varieties of fruits, many of which are inferior to the old varieties and unsuited to the climates in which they were to be planted, and further taking into consideration that they are just one generation from a seedling, why should they be equal in quality to taking something already grown which was good and improving the quality of it by bud selection? In recent years I noted a great improvement which was being made in corn by breeding, and in a number of other things, such as, for example, the Germans had increased the sugar beet about 15 per cent; and yet while these improvements were



Birdseye view of 100,000 pedigree apple trees of finest blood, grown by the Winfield Nursery Company, the first photograph ever exhibited of pedigreed fruit trees



A close view of two-year-old apple, all pedigreed stock of the Winfield Nursery Company, showing the superior individuality of this class of trees

of trunk 10 inches; in fruiting 4 years; produced last crop fifteen boxes fancy fruit.

It is through this line of work that we hope to succeed, and though it costs more money, we shall go ahead, as we find the progressive planter quite willing to pay for this class of stock, and we believe that it will in time revolutionize nursery work, or growing of pure trees, and the people will learn that trees are not like cordwood, and that price should not be governed alone by the size of the tree they buy or amount of wood they get. Our work has perhaps been best demonstrated by the following example: In Elberta we classified some thirteen strains; we are now growing in peach what we call the Hottes Elberta, which is simply an individual Elberta peach that matured a full crop of remarkable fruit at three years of age, and as an illustration of

what the second generation of this peach is doing, we quote from Professor Favor of the Fruit Grower of St. Joseph, Missouri: "This is the first Hottes Elberta I have seen seen or tasted. In appearance it is mighty fine, but on the inside it has all the various strains of the Elberta beaten. It is more distinctly a free stone than any other variety, but to my notion is decidedly sweeter."

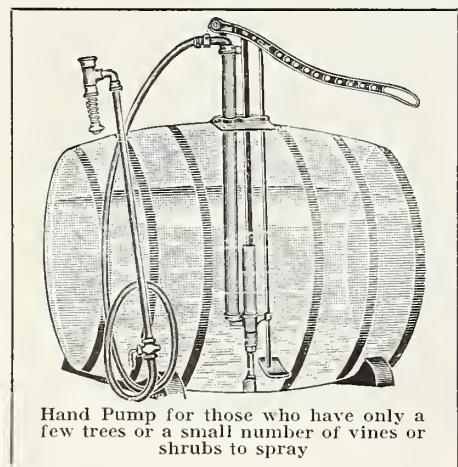
The following letter indicates the remarkable early bearing of this same peach: "Winfield Nursery Company, Winfield, Kansas: A year ago last

spring I set out one of your Hottes Elberta peaches. This tree is planted inside of fifty feet of three eight-year-old Elberta peach trees belonging to my neighbor, which trees are sheltered by his house, are carefully pruned every spring and given the best of care. I have lived here four years and in that time have seen irregular crops of Elberta peaches on these trees. This year the crop was a failure on these eight-year-old Elberta peach trees, there being only six peaches on the three trees, while on my little Hottes Elberta peach tree was grown and matured thirteen perfect peaches. These peaches averaged about ten inches in circumference, were a beautiful color and much finer grained and sweeter than any Elberta peaches ever grown on my neighbor's trees. I also observed that my Hottes Elberta has a much smaller pit and did not cling to the meat as do the ordinary Elbertas. I am sixty-six years old and have lived in Cowley County ever since 1870. Have raised Elbertas on my farm and am familiar with this variety, and I have never seen anything in the Elbertas to compare with the Hottes Elberta. Yours truly, J. W. Groom, Winfield, Kansas."

We are now following a system of having men study orchards all over the country and mark trees showing individual merit, and are watching these trees for two or three years to see whether the quality and quantity of fruit is what we desire and is more than the ordinary; if it meets our requirements we propagate from it. A number of horticulturists and scientists from different sections of the country have visited our plant and everyone agrees that our methods are right. This line of progress we aim to carry out until every tree or plant which leaves our firm shall be a pedigreed plant.



Washington State Exhibit at the St. Paul Land Products Show, December 12 to 23, 1911



Hand Pump for those who have only a few trees or a small number of vines or shrubs to spray

Augusta County, Virginia, A Fine Apple Section

By D. C. Fitzgerald

VIRGINIA'S largest county, Augusta, with an area of 647,680 acres of land, is situated in the western part of the state and in the heart of the Shenandoah Valley, extending from the top of the Blue Ridge Mountains on the east to the Alleghany Mountains on the west. The general character of the

the year 1911 will witness the planting of some 60,000 apple trees of well known commercial varieties in Augusta County. Peaches do well in certain sections; the Augusta peach is mostly grown and finds ready market locally at from \$1.25 to \$2 per bushel. Peach growing is on the increase, as evi-

the James River flow south through the western part, and the many thousands of clear, pure springs found in every part of the county make this one of the best watered sections in the Southern States. Water power is developed along the principal streams, and the wheat and grains of Augusta are ground at home and shipped to all parts of the South. Here we have spring water so pure, so clear and so healthful that it is bottled and sold in the large cities.

Here in Augusta County is to be found the commercial apple orchard in its perfection, planted in proved soils in blocks of from 5 to 100 acres, with every tree a perfect specimen, low headed, forks arched, bark clean and smooth, and with wide spreading and strong main branches, with open top for entrance of the air, sunshine and rain, so essential to the proper maturing and coloring of all the apples on the tree. The tree rows are straight, the ground clean cultivated, no crops grown in these orchards except apples and an occasional cover of clover or grass, which is turned under to enrich the soil and add plant life to the trees; each tree an income producing unit and cared for accordingly. Augusta County orchardists have learned from their twenty-five years of intelligent study and development the vital importance of careful selection of nursery stock, proper setting and constant attention to spraying, pruning, cultivation and fertilization, and today the money returns, which frequently run up to \$875 net per acre per year, prove that this development work has been well and truly done.

Apple orchard land, with proved soils, proper air and water drainage, and near to good towns and shipping points, can be bought for \$15 per acre for land in the raw state, that is, in



Beautiful Shenandoah Valley Orchards

surface is gently rolling and affords excellent drainage for apple orchards and the grass and grain farms. The soils are mostly limestone, very productive and with a stiff clay sub-soil. The elevation above sea level is 1,200 to 1,600 in the apple growing sections of Augusta County.

The apple is king in Augusta. It grows to perfection—large, high colored and fine flavored red apples, with a "waxy" skin and luscious—by the hundreds of thousands of bushels that find ready market in New York and all the large cities, and that make friends wherever they go. Augusta County's apples are: The York Imperials, a red winter apple of full size, sub-acid in flavor and one of the best keeping apples in cold or ordinary storage; Virginia Winesaps, a well known red winter apple, reaches perfection here; the Stayman Winesap, an improved dessert apple of recognized flavor, with a beautiful color and a favorite in all markets; the "Lowry," the new dessert apple which was propagated in Virginia, is grown extensively in Augusta County, and the best proof of its merits and value is shown by the sales of Lowrys from Waynesboro section orchards in May at \$5 per bushel. The Newtown Pippin is grown in the black loams on the Blue Ridge Mountains in Augusta County. Ben Davis, Bonum, Grimes Golden, Limbertwig, Maidens Blush, Pilot, Gano, Northern Spy and Delicious are also grown, and

dened by a prominent fruit grower in this section who is planting a fifty-acre peach orchard on the Blue Ridge at the 2,600 feet elevation.

The three forks of the Shenandoah River flow north through the eastern part of the county, the headwaters of



Virginia Winesaps, Lowries and Albemarle Pippins, grown in Augusta County



The Bean Spray Pump Factory

brush, with no house or development, and \$35 to \$50 per acre for better class of land near towns and railroads, and with good houses, barns, fences, and all cleared and in high state of cultivation and ready to set out the trees. Clearing the brush land costs from \$7.50 to \$15 per acre; apple trees of the best varieties and of the best nursery stock cost 20 cents each; our orchards are planted 30 to 40 trees to the acre, and trees can be set in the land at five cents each. This figures the cost to buy, clear and set land in apple trees at a total of \$35 per acre for the raw land, and the modern methods of inter-planting between the young trees makes it possible to make the orchard pay for itself up to the bearing age by growing such crops as Irish potatoes, cantaloupes, berries, etc., all of which crops are sold at profitable prices in the local market. Strawberries and cantaloupes grown here can be marketed in New York. These apple lands yield as high as 200 bushels of Irish potatoes to the acre that sell locally from the field at 45 to 60 cents per bushel.

You can do all this as well, possibly better, than our apple growers. It is no secret. These are broad-minded men, these apple growers, who will welcome you and give you all necessary assistance in starting and developing the orchard. Is it worth trying? Come to Augusta County, Virginia, and investigate; this is the place, now is the time. Expert orchardists and experienced apple growers from other sections, notably from Oregon, have inspected carefully the apple orchards and kindred conditions in Augusta County and pronounced them equal to the best as to productiveness, quality of

fruit, earning values and certainty of crops of any to be found in this broad United States of America. A Virginia apple orchard is within the reach of the men of moderate or small means, and the same results can be accomplished as on the \$500 to \$1,000 per acre land elsewhere. Live while you do live and live in "The Beautiful Shenandoah Valley of Virginia," amid her blossoms and her fruits.

APPLES AND PEACHES

E. E. Thornton, of Houston, Mississippi, set out 400 Elberta peach trees and 200 York Imperials in November, 1906. The following fall he planted 50 Mamie Ross peach trees and over 100 Red Bird Clings, Chinese Clings and Mayflower trees. At three years old, in July, 1909, the 400 Elbertas yielded \$280 worth of peaches sold in crates, and 500 three-pound cans were put up, which latter sold readily for \$1.80 per dozen. In July, 1910, the same trees yielded a profit of \$144 per acre, and the indications are that the next crop will exceed this figure. The York Imperials began to come in this year, the 200 trees averaging nearly one bushel to the tree. These trees are in fine condition and should steadily increase in yield from now on, and will prove one of the best assets on the farm. In connection with this fruit farm, Mr. Thornton raises hogs. He fattens about fifty hogs a year, figuring the pork standing him at around four cents to raise. This farmer bought two places since coming to this section eight years ago. For one he paid \$8.50 per acre, and last fall refused an offer of \$25 per acre for it. The other, bought three years ago at \$13 per acre, he considers worth today \$30 per acre. He states that Chickasaw County is one of the best in the state. The Pontotoc Ridge, which runs through the section, provides the finest fruit soils, while the black prairie land in the eastern part of the county is excellent land for general farming. The lands, Mr. Thornton states, are well lying, well drained and capable of growing the best crops.—Southern Field.

FIELD FORCE PUMP CO.

Elmira, New York, Dec. 16, 1911.
Editor Better Fruit:

We are taking the liberty of sending you under separate cover a copy of our handsome new catalogue for 1912. We believe that this is an unusual booklet in many ways, and trust that you will take a few moments to peruse it

carefully. First, just a glance at the cover. Father Time has dealt gently with our farmer friend. His sun-kissed, intelligent face and his splendid physique betoken victorious battles over destructive pests. He has cultivated, pruned and sprayed until he now looks with pride over his vast orchard, famed for its beauty and productiveness. We are glad to show him as he is—the typical American farmer. Second, as to its contents: (a) A comprehensive treatise on the comparative value of the liquid and dust spray, together with some practical "pointers," not in the least theoretical, but tried and true and worthy of the study of anyone interested in spraying; (b) just a word or two in relation to our mechanical agitator and automatic brushes which play so large a part in the characteristic features of our machines; (c) a complete line of our best selling spraying machines and gasoline engines, adapted for every purpose and embodying many superior features not found in other makes on the market; (d) a set of standard authentic formulas applying to general climatic conditions and given in a clear, concise form; (e) a comprehensive spray calendar treating on fruits, scales, vegetables, insects injuring shade trees, ginseng and cotton, and subdivided under the following heads, viz., Pests, What to Use and Time for Spraying. We believe that in view of the completeness of the catalogue and on account of the information which it contains within its pages that a copy should be placed in the hands of every interested fruit and vegetable grower. The matter contained therein has been compiled from the latest horticultural reports of the different experimental stations in the United States and is, therefore, up to date and reliable. Yours very truly, Field Force Pump Co., Harrison S. Chapman, president.

Mr. B. F. Hurst of Boise, Idaho, was very much in evidence at the Spokane Apple Show demonstrating the Manville Apple Grader. The growers from all sections of the country were very much interested. The fruit grower has been so absorbed in growing his young orchard, and the West is so generous in the way of prolific yield, that comparatively little attention has been given to the economic side of production, but now that orcharding is conducted along scientific lines, in a business way, every grower is endeavoring to improve his product in every way possible and save all unnecessary expense. Further particulars regarding the Manville Apple Grader may be obtained by referring to the page ad which appeared in the December and January numbers of "Better Fruit," or by writing the Manville Fruit Company, Box 847, Boise, Idaho.*



Spraying in the orchard of K. A. West, Hood River, Oregon

A Plea for Nut Trees for Highways

By Daniel N. Pomeroy, Lockport, New York

ONE of the weaknesses of mankind seems to be to cling to old ideas, and even venerate the acts of ancestors, whether they were wise or otherwise. Because the first white men who settled in the New England States made much of the horse chestnut, planting it almost everywhere to the exclusion of better and more valuable trees, planting them along the roadsides and about their grounds, it does not follow that we should perpetuate their practices centuries later, as is now being done in many localities. In Europe this clinging to ancestral ideas and practices is just as much a trait of the people as it is in this country, but fortunately some wise man of ancient times discovered that a tree might be both useful and ornamental, and with the two combined the planter would be doubly blessed. When or by whom the walnut, later known as the English walnut, was first introduced into parts of Europe, and later into England, is now unknown, but it was very early discovered that they were beautiful and easily grown trees, yielding an immense amount of excellent and nutritious food. The fashion or custom once established among the people, the propagation and planting became general, and has continued uninterruptedly in several European countries for more than two thousand years. They are planted along the highways, in parks and forests, and for memorial trees for births and marriages—in fact to set out a tree is considered an act commendable alike in prince and peasant. The result of this custom is to be seen in the normal crop of many millions of bush-

els of English walnuts gathered in France and Italy. Millions of dollars' worth are exported to the United States each year, and we are obliged to pay a high price for them, although these trees will grow here as freely and bear as abundantly as in any country of Europe.

It has been known for some time that this tree thrives in Western states, California and Oregon being noted for their crops of English walnuts. A professor of a state agricultural college of one of these states writes of the walnut industry: "It offers one of the finest fields for investment to be found. From the seventh or eighth year on the investment will pay good interest on a valuation of \$1,000 per acre, and a good bearing grove will easily bring that figure." Another Western authority of international fame on his knowledge on tree propagation states: "If on deep, well drained land you will have in six to eight years a grove of walnuts which will pay at present, or even much lower prices, a most princely interest on your investment." As it is now over thirty years since the French varieties were introduced into the Pacific Coast sections the industry has now grown to great proportions in the West. California now produces a more valuable crop of nuts each year than oranges. A nut grower who recently went to France to get information and ideas on their culture was much surprised at the trees being grown in most any place rather than in orchards. The Isere Valley is the home of the Mayette, or Grenoble, walnut. This variety of walnut brings the highest price in the

New York market of any of the imported varieties. In the foothills of the Isere Valley are growing thousands of walnut trees, but only a small proportion of them are planted in orchard form; most of them are growing singly or in small groups, for the land is valuable and the fertile spots must be used for other purposes, consequently the poorest land, irregular spots and borders of fields and roadways are given over to walnuts, and yet grown under these conditions the trees thrive and yield splendid returns.

The crop of the Isere Valley amounts to several thousand tons, and as the immense product is the aggregate of the holdings of hundreds of small growers, the work of harvesting and curing is not done on an extensive scale, but the individual growers are always able to care for their small gatherings, labor being plentiful and competent. Buyers are on hand as soon as the crop shapes itself, and the first grade nuts are always at a premium. Seconds are in demand at a lower price, and small and defective nuts are used for making oil. Care in the selection of trees should again be impressed on intending planters. Many tender varieties are still being planted, and if such trees withstand the weather and winter kill it is doubtful if they will bear. If this greatest nut growing section of France makes its great success by utilizing what might be considered waste land, mainly along the highways and fences, about homes and barns, it should naturally indicate that we, of most sections of the United States, are not making the most of the opportunities open to us. It is but natural, though, that this is true, from the general belief that the English walnut



English Walnut Farm, Lockport, New York

Daniel H. Pomeroy, grower of Hardy Pomeroy English Walnut trees. Young trees in front of scene on both sides and older trees about homestead. To Western readers the age of this home may be interesting—built in 1823 on land bought of Holland Land Company in 1810 by grandfather of the writer

could not be grown only under the most favorable conditions and in frostless climates. It is true that most varieties will not withstand cold or zero weather, but it has been proven in recent years that the most severe Northern climates will not affect the variety known as Hardy Pomeroy English Walnut.

The English Walnut Farm, Lockport, New York, managed by Daniel N. Pomeroy, has proven conclusively that this tree will make a commercial success in the parts of the country where the winters are subject to weather far below zero. Trees from the English Walnut Farm have been sold in all sections of the United States and carefully tested by the government at state experimental farms, and all reports have declared them an unqualified success. It is a distinct variety, the government expert pomologicalists have discovered, and much superior to the foreign nut in flavor, and is becoming more and more valuable as the demand increases. The English walnut tree should long have been extensively planted as a roadside tree in place of the hundreds of worthless varieties of shade trees to be seen in such positions in all thickly settled parts of our country. We should think of the French in the Isere Valley and of their thousands of tons of nuts grown mainly on the highways. With a hardy variety, now well known and introduced, it should be given a prominent position—not because of its valuable crops alone, but it is a highly ornamental and beautiful shade tree; and since its being proven thoroughly acclimated and its future certain, to neglect planting as many as possible of this tree is neglecting not only the community, but yourself and your family and descendants. It takes a trifle more time to secure the first crop than the ordinary kinds of farm

crops, but an English walnut tree, when large enough to yield from ten to fifty dollars' worth of nuts annually, will not occupy any more land than is required to produce a dollar's worth of wheat, or any other kind of grain. In addition to this there is no annual plowing and seeding to be done for each ensuing crop, for when once established it is good for at least a hundred years, and there are trees of a known age of over four hundred years, and increases in value and productivity with age. If our farmers and others who were planting shade trees twenty-five and fifty years ago had thought of this and put the idea to a practical test the roadside trees would

today have many millions of dollars' worth of nuts, which we are now compelled to import. Taking this view of the subject, is it not natural to ask in all sincerity if it is not about time that a change was made in the kind of trees generally planted along the roads, cross-roads and highways at least? Would you not like to go out in your dooryard and gather more delicious nuts than you could use for all the cakes, and fudge, and salads, and eating you could use?

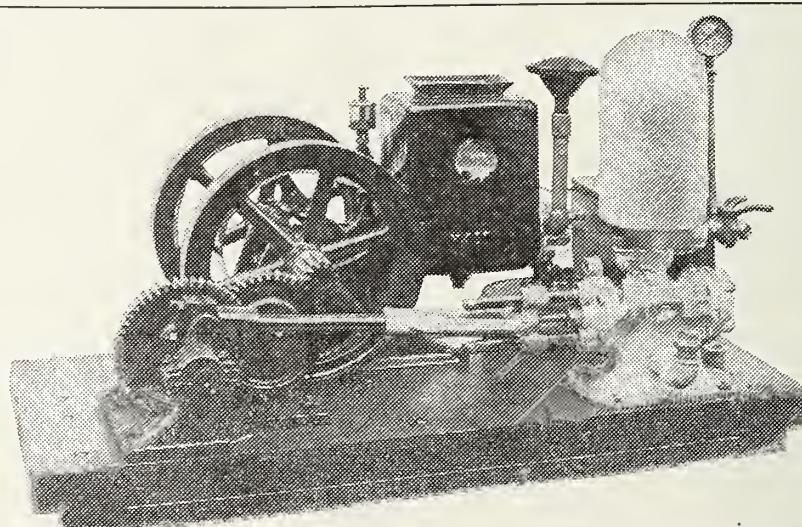
Our ancestors in this country may have been very careless and unwise, or thoughtless, in the selection of the kinds of trees planted, and, however much we may regret it, we should each strive to remedy defects, keeping in mind that posterity will also have something to say about our plantings.

SMALL ORANGE GROVE

J. R. Powell, located on the Bay Shore division of the Mobile & Ohio Railroad, near Mobile, Alabama, has a small orange grove on his place which is just coming into bearing and which gives the finest promise of future profits. There are in the area 150 four-year-old Dorman Bud trees, 50 three-year-old trees and 400 two-year-old trees. The first 200 are bearing well already, one tree last season having over 400 oranges on it. The trees are planted sixteen feet apart and will average about 170 trees to the acre. Prices received for the fruit average 20 cents per dozen, which on an acre represents \$1,132, and as there is but small expense connected with the cultivation and not a large one for picking and packing, profits per acre range around \$500 on good years, and always enough to pay all expenses in poor seasons. This grower estimates that his land and trees up to the present time have not cost him over \$50 per acre, and states that there is plenty of similar land in his section, cutover pine areas mostly, which can be had at exceedingly low prices, and which offers equal opportunities.—Southern Field.

Editor Better Fruit:

A week ago I forwarded you by international money order the amount of \$4.50 United States gold for a further subscription of three years to "Better Fruit," up to 1916. My present subscription expires about end of 1913. Please let me know and confirm. Will you please take note of my new address and change address wrapper accordingly. Yours very truly, Carlos Bartels, Madariaga, Province of Buenos Aires, Argentine Republic.



Will the Small Individual Power Sprayer Replace the Large Jobbing Machine? The trend of sprayer buying seems to point in that direction, and there are several very good reasons why every orchardist owning an orchard sufficiently large to justify it should own his own outfit. The principal advantage lies in the fact that it enables the grower to spray at the proper time, at which time it is sometimes impossible to secure the services of the large machine. Mitchell, Lewis & Staver Company of Portland have anticipated the demand for small outfits and have answered it with the machine above, which they call the Mitchell Jr., and describe as highly efficient and moderately priced. It is composed of a one horse-power Stover Engine and a Myers Pump, mounted on a heavy base.

The Use of Soap to Retard Settling of Certain Arsenicals

By J. R. Parker, Assistant Entomologist Montana Agricultural Experiment Station

WHILE engaged in a cabbage spraying experiment the writer became convinced that arsenate of lead alone was useless because of the failure of the spray to adhere to the waxy surface of the cabbage leaves. Even when applied as a fine mist the small drops would run together, forming large globules which would finally roll off the leaf, or else upon evaporation would leave the poison concentrated in one spot. To overcome this difficulty common laundry soap was added at the rate of two bars to fifty gallons of the mixture. The spray then spread out in a thin film over the surface of the leaf, leaving the poison very evenly distributed and wasting very little by falling to the ground. But while the difference in the matter of spreading over the leaf was quite marked, a more striking difference was noticed in the way in which the arsenate of lead settled in the two mixtures. The appearance of the soap mixture attracted attention as soon as the soap was added. Instead of rapidly settling out and leaving a comparatively clear liquid at the surface the whole liquid seemed to form a creamy emulsion, and there appeared to be little settling in comparison with the rapid settling out of the flaky particles in the non-soap mixture. During the winter of 1910-11 the effect of soap upon the settling of arsenate of lead was further studied in the laboratory and some rather startling results were obtained. Following are the results of the laboratory tests:

Experiment 1.—Object, to determine the difference in the rapidity of settling between a soap and a non-soap arsenate of lead spray mixture. Materials, Star brand arsenate of lead; Peet Brothers' silk soap. Method, glass cylinders two inches in diameter and holding about 750 c.c. were used for containers. The non-soap mixture was made by weighing 20 grams of Star brand arsenate of lead into an evaporating dish, rubbing it into a thin paste and pouring it into the cylinder. Water was added to make 600 c.c. The arsenate of lead was prepared for the soap mixture in a similar way, except that water was added to make 500 c.c. instead of 600 c.c. 100 c.c. of a stock solution containing 2 grams of soap to every 100 c.c. was then added, making 600 c.c. of the mixture in each cylinder, the soap spray containing soap at the rate of two bars to 50 gallons. Both mixtures were vigorously agitated and left to stand for equal periods of time. At the end of the period 500 c.c. of each mixture was siphoned out and the remaining 100 c.c. was transferred to an evaporating dish, evaporated to dryness and weighed. Wherever there was a chance for error it was generally in favor of the non-soap mixture, that is, the combined sources of error tended to make the difference in settling between the two mixtures less striking.

To illustrate, the non-soap mixture was always agitated last and siphoned first, thus giving it less time to settle. Duplicate tests were made in every case, and when there was a difference of over 0.5 gram the test was repeated. The results are shown in the table A. Conclusion, the addition of soap, at the rate of two bars to fifty gallons, to an arsenate of lead mixture retards the settling of the arsenate of lead, only 4.9 grams settling out of the soap mixture in fifteen minutes, while nearly twice that amount settled out of the non-soap mixture in the same time. It may be noted here that in all brands tested, other than Star brand, practically all of the arsenate of lead in the non-soap mixtures settled out during the first fifteen minutes. The amount

that settled out of the soap mixture in five hours was the same as the amount that settled out of the non-soap mixture in thirty minutes.

Experiment 2.—Object, to determine whether the amount of soap used influences the amount of settling in the soap mixtures. Materials, same as in experiment 1. Method, same as in 1, except that a series of three tests was made, using respectively one-half, double and triple the amount of soap used in 1. The results are shown in the table B. Conclusions, above a certain quantity the amount of soap used appears to have little influence upon the amount of settling. It should be noted here that the use of too little soap brings about a condition where the particles of arsenate of lead appear to mass

TABLE A—AMOUNT OF SETTLING IN SOAP AND NON-SOAP ARSENATE OF LEAD MIXTURES

Settling period	Weight of sediment in last 100 c.c. of mixture			
	Soap	Non-Soap	Soap	Non-Soap
15 minutes	4.5	4.8	7.6	7.2
30 minutes	5.3	4.9	9.5	9.6
45 minutes	5.6	5.2	11.4	11.1
1 hour	5.0	5.3	11.4	11.4
2 hours	6.5	7.0	11.5	11.6
3 hours	6.8	7.1	11.6	11.4
4 hours	8.2	8.2
5 hours	9.5	9.6

Note.—The dry weight of 20 g. of arsenate of lead used was 11.7 g.

TABLE B—AMOUNT OF SETTLING FOR DIFFERENT QUANTITIES OF SOAP USED

Settling period	Weight of sediment in last 100 c.c. of mixture			
	1 : 600	2 : 600	4 : 600	6 : 600
15 minutes	(†)	*4.5	*4.8	4.6
30 minutes	(†)	4.9	5.3	5.1
45 minutes	(†)	5.6	5.3	5.6
1 hour	(†)	5.3	5.0	5.7
2 hours	(†)	6.5	7.0	7.2

Note.—The dry weight of 20 g. of arsenate of lead used was 11.7 g.

* Results in these columns were taken from Experiment I.

† This amount was not enough; arsenate of lead settled out as fast as in non-soap mixture.

TABLE C—AMOUNT OF SETTLING IN WHALE-OIL SOAP AND LAUNDRY SOAP MIXTURES

Settling period	Weight of sediment in last 100 c.c. of mixture			
	Whale-oil Soap	Laundry Soap	Whale-oil Soap	Laundry Soap
15 minutes	2.7	3.0	*4.5	*4.8
30 minutes	3.5	3.6	4.9	5.3
45 minutes	4.2	3.8	5.6	5.3
1 hour	4.2	4.2	5.3	5.0
2 hours	7.5	7.8	6.5	7.0

* Results in these columns were taken from Experiment I.

TABLE D—AMOUNT OF SETTLING IN VARIOUS ARSENATE OF LEAD-SOAP MIXTURES

Settling period	Weight of sediment in last 100 c.c. of mixture			
	Grasselli-Soap	Eagle-Soap	Ansbacher-Soap	Star-Soap
15 minutes	4.2	4.2	3.0	4.8
30 minutes	5.5	5.4	4.2	5.7
45 minutes	5.7	5.9	5.1	5.5
1 hour	6.6	6.6	6.1	6.2

* Results in these columns were taken from Experiment I.

TABLE E—AMOUNT OF SETTLING IN SOAP AND NON-SOAP ARSENITE OF ZINC MIXTURES

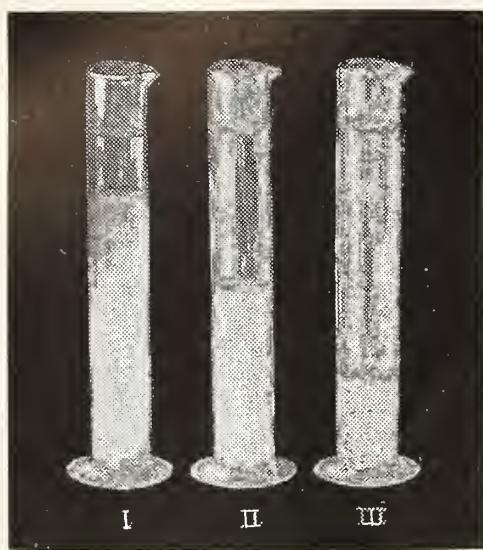
Settling period	Weight of sediment in last 100 c.c. of mixture			
	Soap	Non-Soap	Soap	Non-Soap
15 minutes	2.4	2.9	7.7	7.4
30 minutes	3.2	3.2	9.2	9.2
45 minutes	3.3	3.2	9.1	9.5
1 hour	3.1	3.1	9.4	9.7
2 hours	4.0	3.8
15 hours	7.2	7.1

TABLE F—DISTRIBUTION OF ARSENATE OF LEAD IN A NON-SOAP MIXTURE

Cylinder No.	Weight of sediment in last 100 c.c.	
	of lead used	of arsenate of lead
1	1.2	1.6
4	1.5	2.3
7	1.4	2.0
10	1.5	1.8
13	1.0	1.5
16	1.0	1.4
19	0.5	0.5
Total dry weight of arsenate of lead used	55.0	55.0
Weight of sediment left in spray can	35.4	30.5
Per cent of total weight left in spray can	64.36	55.45

TABLE G—DISTRIBUTION OF ARSENATE OF LEAD IN A SOAP MIXTURE

Cylinder No.	Weight of sediment in last 100 c.c.	
	of lead used	of arsenate of lead
1	2.3	2.2
4	2.2	2.2
7	2.0	2.0
10	2.2	2.1
13	1.9	1.8
16	1.7	1.8
19	1.2	1.8
Total dry weight of arsenate of lead used	55.0	55.0
Weight of sediment left in spray can	11.8	14.8
Per cent of total weight left in spray can	21.54	26.90



The illustration represents in a graphic way the difference in the rapidity of settling in a soap and non-soap arsenate of lead mixture. Cylinder I contains 55 g. of arsenate of lead, the total amount used in a 4-gallon knapsack spray can. Cylinder II contains 35.4 g., the total amount of arsenate of lead that could not be pumped out of the spray can when no soap was used. Cylinder III contains 14.8 g., the total amount of arsenate of lead that could not be pumped out of the spray can when soap was used.

together and settle out even more rapidly than in a non-soap mixture. Two bars to fifty gallons is about the least that can be used, and in practical work it would be safer to use three bars to fifty gallons.

Experiment 3.—Object, to determine whether whale oil soap would act the same as the laundry soap used in experiments 1 and 2. Materials, Star brand arsenate of lead; Good's whale oil soap. Method, same as in experiment 1. The results are given in the table C. Conclusion, whale oil soap gave even better results than the more expensive laundry soap.

Experiment 4.—Object, to determine the effect of soap upon the settling of arsenate of lead other than the Star brand. Materials, Peet Brothers' silk soap; Grasselli arsenate of lead; Eagle brand arsenate of lead; Ansbacher's arsenate of lead. Method, same as in experiment 1. Results are shown in the table D. Conclusion, when mixed with soap there is little difference in the amount of settling in the various brands tried.

Experiment 5.—Object, to determine the difference in the rapidity of settling between a soap and a non-soap arsenite of zinc spray. Materials, "Ortho 40" arsenite of zinc; Peet Brothers' silk soap. Method, similar to experiment 1, except that 10 grams of the dry arsenate of zinc was used in place of the 20 grams of arsenate of lead paste. Results are shown in the table E. Conclusion, the effect of soap upon the settling out of zinc arsenite is even more striking than the effect upon arsenate of lead, more arsenite of zinc settling out of a non-soap mixture in fifteen minutes than out of a soap mixture in fifteen hours. In experiments at this station arsenite of zinc proved the least injurious to fruit trees of all the arsen-

icals tried. Containing about 40 per cent of arsenic oxide, there is reason to believe that if held in suspension by a soap solution it would prove a valuable spray.

To make a practical test of the use of soap to retard settling, soap and non-soap arsenate of lead mixtures were applied with a knapsack sprayer and a comparison was made between the distribution of the arsenate of lead in the two mixtures. The first test made was to determine the distribution of arsenate of lead in a non-soap mixture. The pump used was a Success knapsack outfit, fitted with a small agitator. The intake was three-eighths inch above the bottom of the can. Star brand arsenate of lead was used at the rate of three pounds to fifty gallons, or one hundred and ten grams to four gallons. The arsenate of lead was rubbed to a thin paste in a small amount of water and then added to the remainder of the water in the spray can. The whole mixture was well agitated before spraying was begun. A bordeaux nozzle was used and the spray was directed into glass cylinders holding 700 c.c. Every third cylinderful was saved and allowed to settle for an hour. 600 c.c. was then siphoned off and the last 100 c.c. transferred to an evaporating dish, evaporated to dryness and weighed. As much as possible of the spray was pumped out of the can and the sediment that remained at the bottom was carefully washed out, evaporated to dryness and weighed. The first test showed such a high percentage of the total weight left in the bottom of the can that it was repeated. In the second trial unusual pains were taken to secure a thorough agitation of the mixture and the spraying was done as rapidly as possible in order to shorten the period of settling. The results of both trials are given in the table F. Conclusions, in the first trial the distribution of the arsenate of lead was not uniform, the first cylinderful containing 1.2 g., the last only 0.5 g., while the fourth and tenth contained 1.5 g., the largest amount in any one cylinderful. Sixty-four per cent of the total dry weight, a surprisingly large amount, was left in the bottom of the spray can.

In the second trial the results were a little better than in the first, but the distribution of the lead arsenate was still rather uneven, the first cylinderful containing 1.6 g., the last 0.5 g. and the fourth 2.3 g., the largest amount found in any one cylinderful. Fifty-five per cent of the total dry weight was left in the bottom of the spray can. Two tests were made with the soap arsenate of lead mixture. The general method used was the same as in the previous experiment, except that laundry soap, dissolved in hot water, was added to the

arsenate of lead mixture at the rate of two bars to fifty gallons and the mixture was allowed to stand in the cylinders over night before the upper 600 c.c. was siphoned off. The results are given in the table G. Conclusion, by the use of soap a much more uniform distribution of the arsenate of lead was obtained and the amount left in the bottom of the spray can was reduced one-half.

Whether soap will ever come into general use along the lines suggested in this article, field experiences alone will determine. In knapsack and other similar hand outfits, where little attention is given to securing proper agitation, it would seem that the slight additional cost of the soap would be more than paid for by the more uniform distribution secured and by the prevention of a large percentage of the insecticide from collecting in the bottom of the can. The addition of soap would

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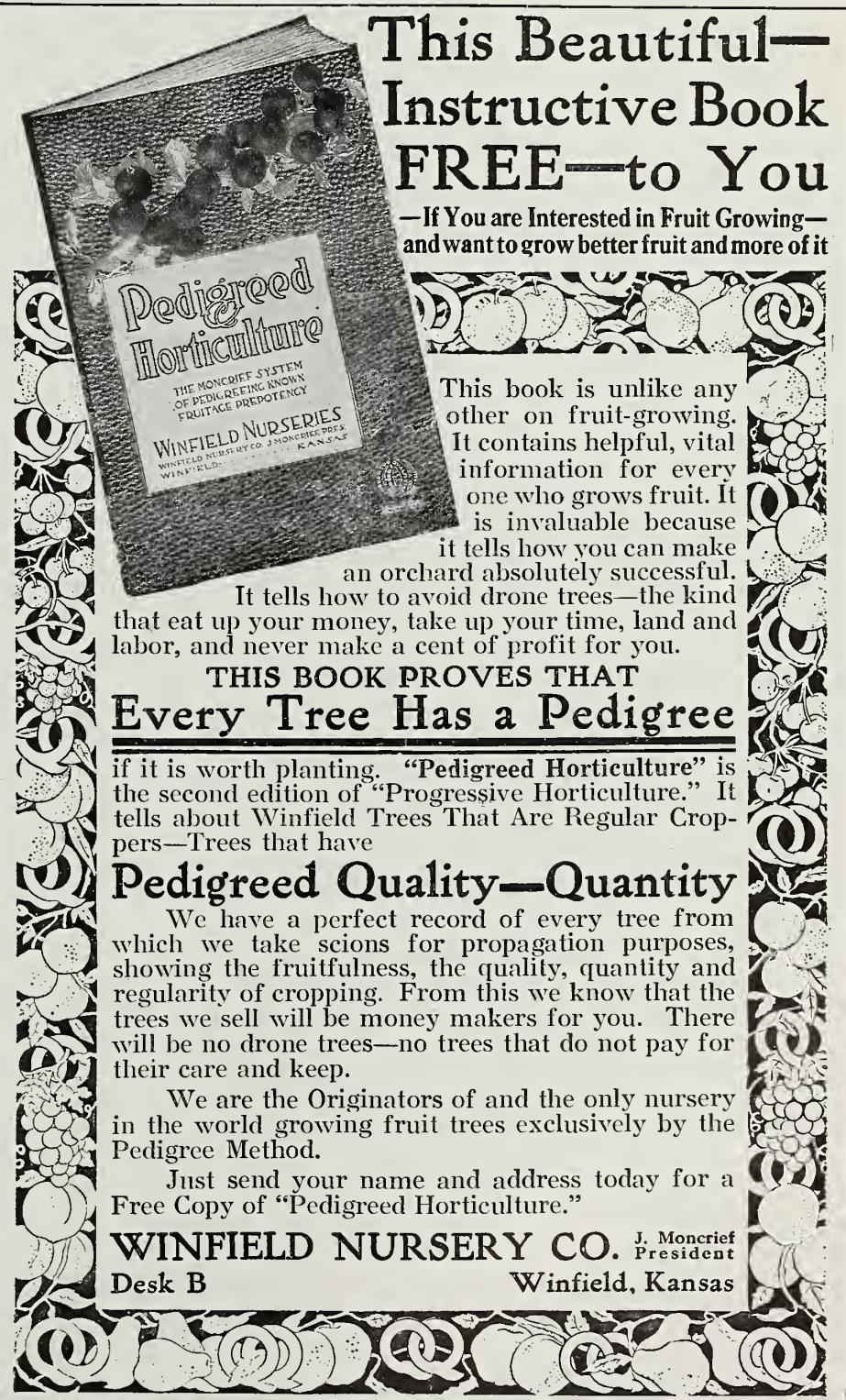
WHEN WRITING ADVERTISERS MENTION BETTER FRUIT

also be of special value in spraying smooth foliage. It is an open question whether soap could be economically used in the spraying of large commercial orchards where the work is done with power sprayers. In a bulletin of the Ohio Experiment Station, Mr. W. H. Goodwin discusses spraying machinery, and states that "Agitators are a frequent source of trouble in spraying outfits, especially in power outfits." After a discussion of the various types of agitators he selects the propeller type as the most efficient. Of the outfits put out by the sixteen most prominent manufacturers of spraying machinery only four are fitted with agitators of the propeller type. From this it is evident that in the majority of power sprayers the agitation is not perfect. Leading economic entomologists and writers for horticultural papers are continually emphasizing the importance of perfect agitation, especially in spraying for codling moth; some writers even stating that the agitator is the most important part in the whole spraying outfit. It is easy to see why so much stress is placed upon this point. In spraying for codling moth arsenate of lead alone is used, and at the rate of two pounds to fifty gallons of water. This means that in one quart of water there will only be four-twenty-fifths of an ounce of arsenate of lead. At such a dilution it is evident that an efficient spray can at all times be maintained only by perfect agitation. The addition of soap would greatly retard settling, and with only a moderate agitation the arsenate of lead would be kept uniformly distributed throughout the spray mixture. The addition of soap would also be of much value in causing the spray to spread evenly over the smooth surface of the leaves, and in the mid-summer spraying the smooth skin of the apple could be more effectively covered than with a non-soap spray. It is evident that there is a possible economic use for soap in connection with arsenate of lead and arsenite of zinc, and it is the intention to determine its value by field experiments in control of the codling moth.

The whole matter may be summarized as follows: (1) The addition of common laundry soap, at the rate of two bars to fifty gallons, to an arsenate of lead mixture retards the settling of the arsenate of lead, only half as much settling out of a soap mixture in fifteen minutes as settled out of a non-soap mixture in the same length of time. The amount that settled out of the soap mixture in five hours was the same as that which settled out of a non-soap mixture in thirty minutes. (2) Above a certain quantity, the amount of soap used appears to have little influence upon the amount of settling. Two bars to fifty gallons is about the least that can be used, and in practical work it would be safer to use three bars to fifty gallons. (3) Whale oil soap gave slightly better results than the more expensive laundry soap. (4) When mixed with soap there was little differ-

ence in the amount of settling in the four brands of arsenate of lead that were tried. (5) The effect of soap upon the settling out of arsenite of zinc is even more striking than the effect upon arsenate of lead, more arsenite of zinc settling out of a non-soap mixture in fifteen minutes than out of a soap mixture of fifteen hours. (6) By ordinary methods of applying arsenate of lead with a knapsack sprayer it was found that the distribution of lead was not uniform and that a surprisingly large amount (64.36 per cent) was left in the bottom of the spray can. (7) By very careful methods of mixing and application slightly better results were obtained, but a far too large amount

(55.45 per cent) was left in the bottom of the spray can. (8) By the addition of soap at the rate of two bars to fifty gallons a more even distribution of arsenate of lead was secured, and the amount left in the bottom of the spray can was reduced to about 25 per cent. (9) The problem of keeping arsenicals in suspension is a very important one, and it has not been satisfactorily solved in the majority of spray outfits. (10) There is a possibility that the use of soap may prove of much value in keeping arsenate of lead and arsenite of zinc in suspension, especially in spraying with hand outfits and in the commercial spraying of large orchards for codling moth.



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The Report of an Expert Orchardist

Troutdale, Oregon, December 14, 1911.

Waldo Hills Orchard Company, Salem, Oregon.

Gentlemen:—On Wednesday, December 6th, I spent the day at the Waldo Hills Orchards, the most of the time in and about the fields with your horticulturist, Prof. Tower. During the day we covered the whole tract, carefully examining the planted orchards and going about the boundary of the entire property. I examined the soil and topography of the various tracts, the cultivation, the condition of the trees of one- and two-year-old growth, as to health, form, size and setting, and the various farmsteads, roads, fences and other improvements upon the orchard lands.

I cannot find in any of these items any fault that would seem in any way to hinder the development of these orchards into one of the most perfect and paying fruit-growing enterprises in the Pacific Northwest. I have yet to see any large, young commercial orchard that seems to be better managed or more intelligently cared for than this.

I think the location ideal, the tracts lying on rather high and more or less rolling land in one of the most beautiful farming sections in the United States. I have seen much of the beautiful farm regions of America from New England to Texas and from Canada to the Gulf; but I have never seen anything in pastoral scenery to surpass the view from Waldo Hills. It is beautiful beyond description.

The road from Salem to the orchards is through well farmed lands, the roadway of easy grade and good bottom. We found a railway station on the farther border of your tract, and I understand that a new electric line is certain soon to pass through your property. Thus in any case the transportation problem is solved beforehand. The soil looks and works like good orchard soil. Judging from the many good old fruit trees in the neighborhood, I should say that there will be no lack of fruit producing elements in the soil. You have been very fortunate or wise in the selection of lands inexpensively prepared for orchards, practically every acre being ready for the plow and harrow. This is an item often overlooked in the setting of new orchards. A matter of very vital interest to you is the general and large advance in land values in this section since you secured these lands. I believe this alone would net you a good profit if your lands were sold today.

Knowing that considerable portions of Oregon are proverbially weedy, I was delighted at the cleanliness of your fields. There is no exception to this. The fields are clean from corner to corner. The trees have no ragged fringe of old weeds about them and the surface throughout the orchards is smooth, showing a good pulverization and constant cultivation through the growing season. I am at a loss to know how so good work can be done by teams and hired labor. If you substitute a traction engine for horsepower as you contemplate, you may be able to do deeper work at less expense. This I do not know. But it cannot be cleaner or more handsomely done. You are hiring labor at lower figures than it can be obtained in my section.

The trees themselves are good to see. They had recently been given their lime sulphur spray, and are to have another near budding time, I am

told. They are clean and vigorous. Their heads are evidently shaped by a man who knows how. I imagine that the most of them have felt the touch of Prof. Tower's own hand, or that of men taught by him. He is a man who as Hamlet would say, "makes love to his occupation." I should like to go to school to him for a season.

It has been said that the orchard business of the west will soon be overdone and therefore unprofitable. Those who know most about orchards by actual experience, know that this will not be the case; for there will be only as many great successful orchards as there are great successful orchardists behind them, and not one more. Such men are as rare as great successful men in any other line. You undoubtedly have one of these at Waldo Hills.

Yours very truly,

(Signed) MILTON O. NELSON.

The foregoing is an unbiased, paid for report. Our directors secure experts to make frequent reports in order that they and our stockholders may know at all times that the best and most scientific work that can be done is being done. Mr. Nelson was formerly a member of the Minneapolis Park Board and his ability and integrity are unquestioned.

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purchase something more speedy. After careful deliberation I purchased, in June, an auto wagon for use in delivering the products of my twenty-acre fruit and produce farm. I can safely say that, as a business proposition, I consider it one of the best I ever made, for I can now handle my business with speed and comfort. My best record,



placed on a practical basis. It is a demonstrated fact that the motor-driven vehicle of today gives service that cannot be obtained from a flesh and blood animal. That a motor-driven vehicle is a profitable investment for the modern business man is no longer a matter of conjecture—it is a conceded fact. The questions that confront the prospective purchaser of the motor truck are: Which truck is best adapted to my business? Will give the best service? Is simple in construction and operation? Can be operated with least expense? Will best meet the required road conditions? Give satisfactory service the year round? Is sold at a reasonable price? These questions he must answer for himself after studying his conditions, and after a careful investigation of the different makes of cars on the market.

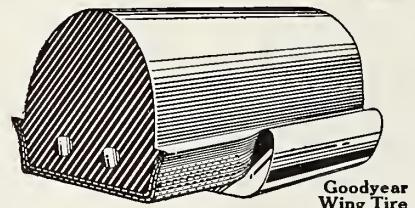
Mr. Isaac E. Andrus, a fruit grower at Missoula, Montana, was confronted with a problem of this kind. His deliveries could not be made with the equipment he had. To buy additional horses would mean much additional expense, because horses must be fed whether they are in use or not. He solved the problem by purchasing a motor-driven vehicle. Mr. Andrus says: "Owing to my rapidly growing trade in the city, requiring several trips daily, each trip covering from seven to ten miles, I found it necessary to either increase the number of horses and vehicles or

however, was made on November 23, when I made six trips into the city, covering a distance of more than forty miles and handling more than 7,000 pounds of package fruit." The experience of Mr. Andrus goes to show that the motor-driven vehicle is a paying proposition, not only from the standpoint of dollars and cents but from the standpoint of comfort, and the satisfaction it gives to the owner of knowing that his fruit and produce are being handled with the least possible delay.—Contributed.

We are advised that the Northern Pacific will make colonists' rates to the Coast from March 1 to April 15, as follows: From Chicago, Illinois, \$33; from St. Louis, \$31; from Minneapolis, St. Paul, Duluth, Kansas City, Cincinnati and St. Joseph, \$25. We presume, of course, other railroads will make similar rates. Rates will apply from all other Eastern points, as the same reduction is made from regular rates from all other points as those specified. A great interest has been created in the Northwest and the Northern Pacific is distributing 200,000 booklets about Oregon. In connection with the colonists' fares it is understood special attention is being called to the Portland Rose Festival and the Elks' grand lodge meeting in Portland this year.

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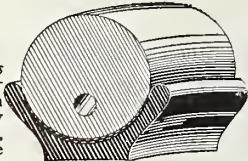
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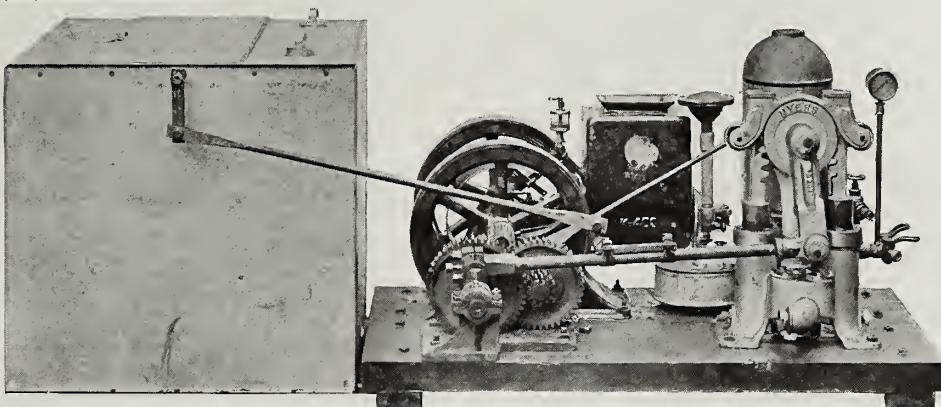
Editor Better Fruit:

Your October issue is so replete with reliable statistical information of greatest value to the fruit grower of the Northwest that I cannot refrain from writing you a line in appreciation of the service you have rendered horticulturists in the collecting and tabulation of information of greatest value. Not only is the information comprehensive and complete, but it is arranged in the most clear manner, making it a compendium of information on the subject of apple growing and marketing. I would like to send copies of it to several persons interested with me in our orchard proposition, and will therefore thank you to send me six copies, together with your bill, for which I will remit promptly. Yours very truly, R. E. Neitzel, Boise, Idaho.

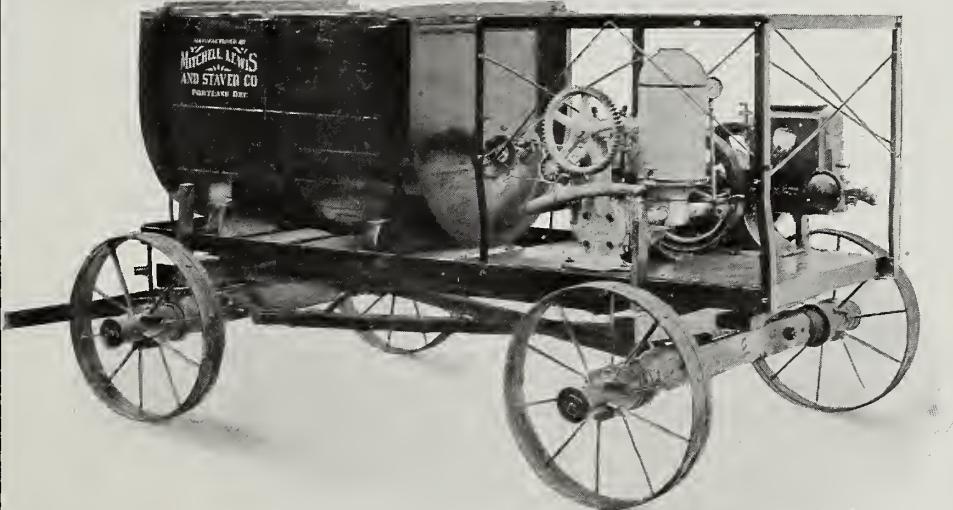
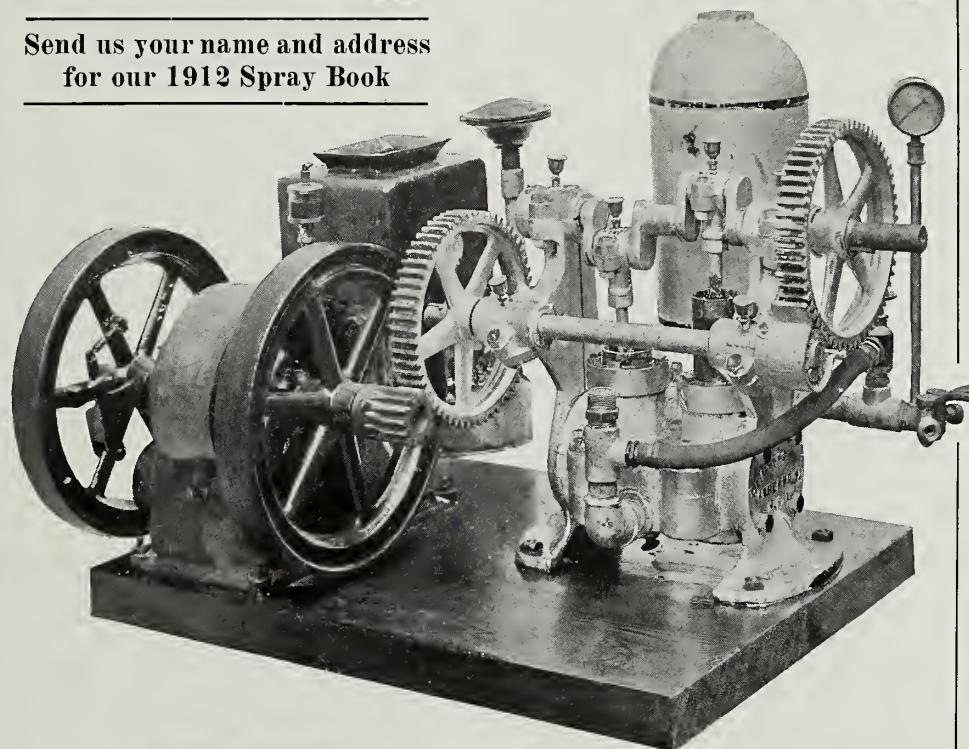
Position Wanted

As manager or foreman of orchard, by experienced horticulturist, who has had several years' experience in Hood River district and can furnish best of references. Address W. L. D., "Better Fruit."

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Washington Agricultural College Spraying Calendar, 1912

THIS was compiled by R. Kent Beattie, professor and head of Department of Botany, and A. L. Melander, professor of Entomology and head of Department of Zoology, of the State College at Pullman, Washington. Following our usual custom, "Better Fruit" publishes it for the benefit of our many readers, in the hope that it will be found useful. Always remember that there is no spray that will cure everything; use the one that fits your case best.

When to Spray	What to Use	What to Spray for	Notes
FALL Just after the leaves fall Especially for Western Washington	Sulphur-lime 3° Beaume	Apple cankers Scale insects Eggs of green aphis and red spider Pear leaf blister mite Woolly aphis Eggs of tent caterpillar Moss and lichens Rabbits and field mice	This spraying may be preceded by a spraying of bordeaux as soon as crop is picked; for canker only. Write for bulletin on sulphur-lime spraying.
LATE WINTER While the buds are swelling Usual spraying in Eastern Washington	Sulphur-lime 3° Beaume	Bud moth; twig borer; peach leaf curl Scale insects Eggs of green aphis and red spider Pear leaf blister mite Woolly aphis Rabbits and field mice Mildew	Too early spraying will miss these. Write for bulletin on sulphur-lime spraying.
SPRING (1) When flower buds are ready to open (2) While the last blossoms are falling	Sulphur-lime Lead arsenate 1 to 50 Sulphur-lime 1.5° Beaume	Apple scab New York apple canker Prune brown rot and fruit mold Codling moth Bud moth; twig borer Young caterpillars Apple scab New York apple canker	Spray when central flower of cluster is about to open. Use bordeaux nozzle with crook and spray with force from raised platform directly into every flower. Repeat immediately. If so applied, these sprayings are usually sufficient. Keep a few trees banded. If many worms are trapped, spray. Write for codling moth bulletin. Omit if there is little seab.
SUMMER When the pest appears	Tobacco (or kerosene emulsion) Lead arsenate Sulphur-lime 1.5° Beaume As a strong wash Bordeaux	Aphis (cherry aphis, etc.) Woolly aphis on branches Red spider Oyster shell bark louse Leaf hopper Pear and cherry slug Caterpillars Colorado potato beetle Fruit spot (Baldwin spot; punk rot) Mildew Red spider; young of oyster shell bark louse Trunk borer; flat-head borer Flea beetles Cutworms Grasshoppers Potato blight	About June 1 for newly hatched young. Spray early before they acquire wings. Use 1 pound to 75 gallons. Or dust with lime, ashes, or road dust. Use 1 pound to 40 gallons. Early in July. (Treatment in experimental stage.) Keep trunk coated all summer; best to add excess lime. As a repellent. July 1-15; repeat in two weeks. If much blight near by, give a third application two or three weeks later.
Pests controlled by other remedies than spraying		Pear blight (fire blight of pear and apple) Western tomato blight Potato seab Smut of wheat and oats Root maggot of radish, turnip, cabbage, etc. Cabbage worms Climbing cutworms Garden cutworms Woolly aphis on roots	Prune out every sign of blight, cutting well below the disease. Swab every cut with corrosive sublimate (1 to 1000 of water. Clean blade often with carbolic acid or you will spread the blight with every cut). Set out strong plants close together, or plant the seed thickly in the rows. Give best of care, shade, and plenty of water. You will probably lessen the blight. Soak seed for two hours in formalin, 1 pound to 30 gallons water, then cut and plant. Don't plant in soil where scabby potatoes were grown. Spray seed thoroughly with formalin, 1 pound to 45 gallons water; cover and let lie in a pile two hours. Dry and plant with a clean seeder. Spray soil with carbolated lime before maggots appear. Repeat often. Cultivate well after crop is removed. Place a three-inch tarred paper collar on young cabbage plants. Paris green 1 part, bran 30 parts. Mix well. Dust the plants before the worms eat in. Paris green 1 part, bran 30 parts. Make a mash by adding water. Season with a little molasses, stale beer or salt. Scatter by spoonfuls near but not on trees, or before planting among plants. Expose roots as much as practicable and spray with tobacco, kerosene emulsion or sulphur-lime. Root treatment is not completely reliable.
Fumigation for insects		For nursery stock use 1 ounce cyanide to 100 cubic feet For grafts and scions, use $\frac{1}{2}$ ounce cyanide to 100 cubic feet	To every ounce of pure potassium cyanide (poison) add $1\frac{1}{2}$ liquid ounces sulphuric acid diluted with $2\frac{1}{2}$ ounces water. The gas generated is extremely poisonous. Fumigate 30 to 45 minutes.

Spray thoroughly. Direct your attention to the hardest places to reach. Cover every surface. Wet behind the buds. Reach the bottom of every crack. Fill the lower calyx cup. Do not try to economize on spray. For all orchard spraying use a high pressure pump (at least 200 pounds). Use bordeaux nozzles only. Use an eight-foot spray rod. Have a crook to set nozzle at an angle of 45 degrees. Spray from a tower if the trees are beyond your reach.

Sulphur - Lime — Sulphur, 1 pound; stone lime, $\frac{1}{2}$ pound; water, $\frac{1}{2}$ gallon.

Slake the lime in the cooker. Add the sulphur and the water. Boil briskly till the sulphur is dissolved (about 45 minutes), stirring continuously and keeping the cooker covered. As it boils down keep adding water. When finished let it settle. Use only the clear liquid, which may be stored if kept from the air. Prepared in this way, sulphur-lime should have a hydrometer reading of about 26 degrees, but little

weaker than the factory-made product. For use, any concentrated sulphur-lime may be diluted according to the following table:

Hydrometer Test of Concentrate	Beaume 3° Sp. gr. 1.02	Beaume 1.5° Sp. gr. 1.01
Degrees Specific	1 lb. sulphur in 5 gallons	1 lb. sulphur in 10 gallons
34.....	1.302.. 1 to 14 of water	1 to 28 of water
32.....	1.279.. 13	26
30.....	1.259.. 12	24
28.....	1.236.. 11	22
26.....	1.215.. 10	20
24.....	1.196.. 9	18
20.....	1.158.. 7	14
16.....	1.122.. 6	11

Arsenate of Lead—Arsenate of lead (poison), 1 pound; water, 50 gallons.

For newly hatched insects it is not necessary to use it stronger. Mix well first with a small amount of water. Powdered arsenate of lead is about twice as strong as the paste. Do not use arsenate that settles quickly. One pound of arsenate of lead may be added to every 50 gallons of sulphur-lime (1.5 degrees) as a combination spray for codling moth and apple scab.

Kerosene Emulsion—Kerosene, 2 gallons; whale-oil soap, $\frac{1}{2}$ pound; water, 1 gallon.

Dissolve the soap in the water by boiling, and add the suds boiling hot to the kerosene, away from the fire. The mixture is then to be agitated violently, preferably by pumping it back on itself with a force pump. After four or five minutes the mixture suddenly becomes creamy in consistency. If well made, the cream will stand for a long time without free oil rising to the surface. Unless otherwise stated, use 1 gallon of the emulsion to 12 gallons of water in spraying. One quart soft soap or one pound laundry soap may be used instead of the whale-oil soap.

Tobacco—Tobacco leaves, 1 pound; water 4 gallons.

Simmer for one hour and strain. Two pounds of tobacco may be substituted for the leaves. Black Leaf Extract may be used, 1 part to 65 parts of water. Use 1 part of "Black Leaf 40" to 600 parts of water. A little soap or Lysol added to tobacco sprays greatly increases their value, and permits further dilution.

Carbolated Lime—Lime, 10 pounds; water, 50 gallons; carbolic acid, 1 pint or more.

Slake the lime with a little water, add the rest of the water and carbolic acid.

Bordeaux—Bluestone, 6 pounds; good lime, 4 pounds; water, 50 gallons.

Dissolve the bluestone by suspending it in a sack in 25 gallons of water in a barrel. Slake the lime in another vessel, adding a little water slowly, and dilute to 25 gallons. Mix the two thoroughly. Even the best bordeaux may scorch in rainy weather. For double strength bordeaux use twice as much bluestone and lime.

Editor Better Fruit:

I am always ready to do anything I can for "Better Fruit," for it is the best horticultural magazine in existence, and I feel that you have done me a great deal of benefit, and by the perusal of your magazine anyone who is interested in horticulture will get a great deal of benefit. I am always glad to do anything I can. Very respectfully yours, Lot L. Feltham, Weiser, Idaho.

Editor Better Fruit:

We are preparing the volume of "Better Fruit" for 1911 for the bindery and find that we lack the issue of August. If can favor us with a copy of that issue please send it forward at your earliest convenience. Yours very truly, The Fruit-Grower, E. H. Favor, associate editor, St. Joseph, Missouri.

The Bean Spray Pump Company, of San Jose, California, is now turning out its largest power outfit, the Bean Giant, with a two-cylinder pump, as well as the three-cylinder pump that they have used heretofore. This gives somewhat less capacity, but lowers the cost of the outfit. The Bean Giant can also be furnished with a 4-h.p. engine.*

How the Motor Power Helps the Fruit Grower

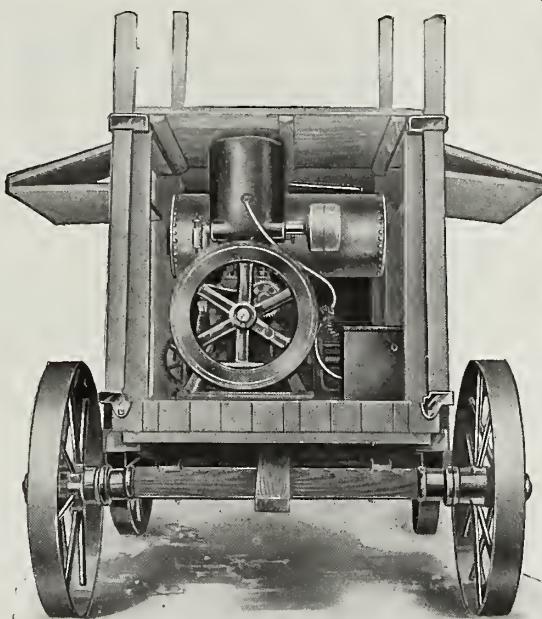
SAVES TIME SPRAYING HIS TREES

Farmers were among the last to benefit from the application of motive force other than that supplied by the strength of men and animals and the power of wind and water. In recent years, however, steam, gas, gasoline and electricity have effected a great saving of time and effort in practically every branch of farm work. The well-equipped farm of today is as different from the farm of fifty years ago as the liner of 1912 is different from the wind-jammer.

An interesting development in the use of gasoline was that made by the Spramotor Co. of London. They were pioneers in the making of spraying machines and have placed on the market a number of models which, owing to the greater power utilized, are much more efficient and rapid in action than the ordinary kind. Since the Spramotor Co. made their first machine they have introduced many improvements into the original design, and the latest Spramotor—Model C—is the best spraying machine yet devised.

Here is what one user says about it:

"This season my Gasoline Power Spramotor has worked well all the way through. It has made a record for the Spramotor Co. We have a big lot of trees, and these were all sprayed from one side before the buds opened. We find that we can spray about 1,000 bearing apples or 4,000 bearing pears on one side per day in good weather. There has been no delay."



Position Wanted

By man who has taken a two-years' course in fruit growing at an agricultural college, and who has had experience in the East and in the Hood River Valley for the last two seasons. Can take charge of any kind of orchard work. Address N. N. N., care of "Better Fruit."

J. F. LITTOOY

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Land, irrigation and orchard schemes examined for owners, buyers, bonding companies or advertising agencies—Orchard and land values estimated—Orchard soils examined—Directs orchard development—Land damage claims estimated—All business confidential.

MOUNTAIN HOME, IDAHO

WANTED

Married man, about 40 years of age; experienced and well recommended in general orchard work; must be a hustler. Will furnish good wages. Benton County, Washington, on the Columbia River. Address J. S. P., care "Better Fruit."

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We are headquarters for the famous Watsonville, California, apple orchards, in a section which has proved its worth by annual shipment to points all over the world of over 4,000 carloads of the finest apples grown. Buy now, and take advantage of present low prices, and live in an ideal climate where frost, ice and snow are never known. Send for our list of over 100 bearing apple orchards, netting from 15 to 30 per cent, at prices ranging from \$300 to \$1,000 per acre, with all improvements. Don't buy until you have seen this famous apple district.

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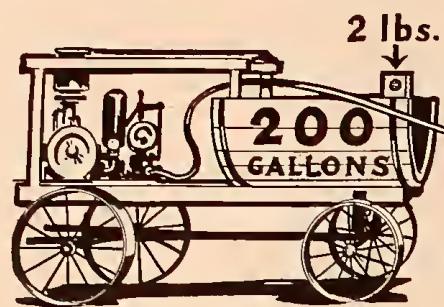
APPLES, PEARS AND NAVEL
ORANGES

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in the midst of a delightful environment? A resort city with all modern improvements, mineral springs, scenic attractions, etc. Homeseekers needed to develop small tracts in the vicinity of ASHLAND, in the famed Rogue River Valley of Southern Oregon. For information regarding fruit, gardening, poultry, dairy products and stock-raising, address COMMERCIAL CLUB, Ashland, Oregon.

Advertisers please mention "Better Fruit" in correspondence.

BETTER SPRAYS MEANS BETTER FRUITS



"ORTHO 40," the New Arsenite Compound, Kills Codling Moth Without Damage to Foliage or Fruit

"Ortho 40" Costs Less, Does More

The quickest and surest way to increase the grade of your pack is by careful spraying. For the apple grower, spraying is a necessity. His problem is to determine what is the most effective and economical spray.

Many growers are finding the way to better fruit and cheaper growing methods through "Ortho 40."

"Ortho 40" is a white, fluffy powder, containing 40 per cent of arsenious oxide in combination with other chemicals that make the powder, as a whole, insoluble in water, yet readily dissolved by

the juices secreted in the intestinal tract of the caterpillar. It is applied to the blossoms and leaves in the form of a spray. "Ortho 40" is packed in cartons holding two pounds, this being enough for 200 gallons of spray. The powder is dumped directly into the sprayer tank, no mixing being necessary.

In 40-pound lots "Ortho 40" costs 20 cents a pound, or 40 cents for 200 gallons of spray. This is less than half the cost of any other arsenical compound. Because of its large covering power, a lighter spray can be applied, resulting in a material saving of time and labor, as well as chemicals.

When the water of the spray evaporates, "Ortho 40" remains on the leaves and blossoms in the form of a thin film. Dew or fog does not dissolve it, thus preventing damage to foliage, so common with other arsenical compounds. Instead, the poison remains in such form that when the caterpillar begins to feed, a small particle of "Ortho 40" is sure to enter his stomach, resulting in quick and certain death.

Its use, dating back to 1907, has resulted in a uniform record of success, and we absolutely guarantee "Ortho 40" to more completely control the codling moth than any other compound known to horticulturists.

For complete information regarding "Ortho 40," and its remarkable results, sign and mail return coupon today.

Our Guarantee

We guarantee "Ortho 40" to be made from the best commercial chemicals and to contain 40 per cent of arsenious oxide in combination. Properly applied, it will control the codling moth better than any other spray material.

If, after using this material, you are not satisfied, we will refund the purchase price.

Sign and mail the attached coupon today, and it will bring you a booklet containing much valuable information on spraying, and will show you how to increase the profit in your orchard.

It will show you how to save money in your spraying. It will tell you how other growers have increased the grade of their pack. It is a mine of information for the apple grower.

Send for it today.

"Ortho 40" Kills the Worms and Does It Quickly

The greatest pest of the apple grower is the codling moth. Horticulturists and entomologists have given years to the study of this pest, and its life history is well known.

Its greatest havoc is wrought at two distinct seasons of the year. The first is in the spring. The second, during the months of July and August, when the second generation of worms are hatched and eat their way into the heart of the apple.

The time when spraying is effective is short, and a poison of more than ordinary deadliness is necessary to stop the codling moth. Arsenic has been found to be the only effective poison for combatting it. Pure arsenic dissolves readily in water, burns the foliage and injures the soil, thus making its use impracticable. Many arsenical compounds have been tried, and those that would kill the worms, damaged tree and soil.

After long and costly experimenting a compound was invented containing zinc arsenite. It is practically insoluble in water, yet when eaten by the worms is at once dissolved with deadly and almost instantaneous effect. This compound is offered to the apple grower under the name

"Ortho 40"

and its results are guaranteed when used as directed. It has been used in various sections from California to Colorado since 1907, and has never failed to absolutely control the codling moth wherever tried.

One Watsonville grower offered a dollar for every wormy apple that could be found in his forty-acre orchard after he had sprayed with "Ortho 40." We offered another dollar. Only two wormy apples were found in forty acres.

One of the largest fruit companies in the Pacific Northwest wrote: "We have not been able to find one single wormy apple in our 100-acre orchard." We have dozens of testimonials like these and will gladly send the names and addresses of growers who can vouch for "Ortho 40."

But you are interested in the results of "Ortho 40" in your orchard. We claim, and are ready to back up our claims, that "Ortho 40" will control the codling moth better than any other form of spray, and if properly used, will increase the average grade of your pack 20 per cent. Get our booklet on spraying. It explains in detail how and why.

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Watsonville, California

Warehouse, Portland, Oregon. Also Distributors in All Western Fruit Growing Sections

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Gentlemen: I am interested in Watsonville, California
and reducing the cost of spraying. Will you please send me your
booklet, giving the name of the company that reduces the cost of spraying.
Ortho 40 can be obtained very easily in your nearest distributor, where
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HOOD RIVER, OREGON

OFFICIAL ORGAN OF
THE NORTHWEST FRUIT GROWERS' ASSOCIATION
A MONTHLY ILLUSTRATED MAGAZINE
PUBLISHED IN THE INTEREST OF MODERN
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ALL COMMUNICATIONS SHOULD BE ADDRESSED AND
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The fruit grower is progressive; he adopts modern methods. Perhaps the largest problem to solve is the one of co-operation and how far it can be carried. We may not solve the problem today or tomorrow, but it will be solved sooner or later, without any doubt. In considering this as one of the main issues before the fruit grower, it should not be forgotten that he has other matters, although of minor importance, which are on the whole of great importance to the individual. A great deal could be said on this subject and much will be said in later issues, but while we are absorbed in the marketing problem, let us not forget the economic side—the cost of production. Ten cents a box saved in cost of production is equal to ten cents a box extra on price. The fruit grower is human; if he can save money in cost of production and get better prices, he is naturally entitled to it, and he is justified in wanting both.

People will not pay more than an article is worth, or, expressing it differently, more than the market value, but the market value we ought to get. Market values can be increased by proper distribution. In this connection it might also be said that unnecessary expense in marketing should be avoided, which gives rise to the question, "Is there an unnecessary expense in marketing?" We assume there is, from a statement made by George T. Powell, president of the Agricultural Experts' Association,

in an address delivered to one hundred farmers of Pennsylvania, at a meeting held in New York City September 28, in which he states that "the farmers who supplied New York City with potatoes in 1910 received \$8,000,000 for that for which the consumer paid \$60,000,000." In what manner the \$52,000,000 was absorbed in marketing is worthy of investigation on the part of the potato grower.

The railroads are certainly entitled to their share at a living profit, which is a large item, and the wholesale dealer is entitled to his profit, and the retail dealer is also entitled to his profit. These three expenses, it seems, are unavoidable items, but is there any other extra expense that can be eliminated, and if so, what? The same pertains to other agricultural products and to fruit as well, in which the fruit growers are vitally interested.

That the retail profit of the fruit dealer is abnormally high is probably not questioned by anyone familiar with the business, except the retail fruit dealer himself, and it may be added that by this statement it is not meant that all retail dealers make an exorbitant profit, but that many do is a generally admitted fact, and to what extent a retailer in any line of farm products takes a profit that is more than his legitimate share is a problem to be solved and a problem to be met if possible. Many particular instances may be cited, but one is sufficient to indicate that such a condition exists. One retail fruit dealer in a large Eastern city, in a very small store with a stock of goods amounting to probably not over \$100 at any one time, after paying all his expenses in conducting his business and his living expenses besides, sent \$3,000 in one year to his home in Europe.

Over-Production: An old subject, but always a live subject.—Has there ever been a continued over-production of any food commodity? Temporary over-production may be possible in any class of business or in any product of the soil, but Nature seems to regulate this to a great extent. Over-production is a matter which takes care of itself. As soon as any product begins to reach the cost of production, in price, development in that line naturally ceases until the demand again is equal to the supply at satisfactory prices.

A great many people are doing some very wise figuring in reference to the product of fruit in ten years from now, by taking the total number of acres that are set, adding on the number of acres that will be set, and multiplying this by far above the average annual yield. Apparently they are not aware of the fact that men who have studied the fruit industry for years make the statement that only from ten to twenty per cent of the fruit trees that are set in the United States ever make commercial orchards. Even the fruit grower himself frequently misleads people who write articles on over-production. In

the year 1911 nearly every section over-estimated the number of cars that they actually shipped. Of course there will be the year occasionally when the fruit grower will under-estimate, but generally speaking the fruit grower is prone to over-estimate his production. We must take the fat and lean years and strike a fair average.

A great deal of money has been spent in the publicity way to develop the resources of the Northwest, some wisely and some perhaps unwisely. From now on it is evident that this will be a live topic for consideration. That the Northwest needs capital, factories and farmers is unquestioned. If a certain amount of money being spent in publicity ways could be spent to advertise the fruits of the Northwest, creating a wider distribution, a greater demand and obtaining better prices, it seems that it would be well spent. The result would be better prices, and better prices mean greater net profits to the fruit grower. If we can spend money in the manner as indicated above to show a greater net profit on the investment, it would certainly seem a plan well worthy of adoption and one which would undoubtedly attract men to come to the Northwest with capital, and the same thing may be said of any of the products that we grow, and if it is true in reference to the fruit industry, the principle is certainly true as to all other products of the soil, such as we raise in excess of the quantity consumed at home.

"Better Fruit" received 222 subscriptions by mail January 11th. Our circulation is increasing very rapidly. We are counting our lists now and will have considerably over 13,000. We are publishing 14,120 copies of this edition. That our advertisers get results must be evident both to the advertiser and the fruit grower, from the volume of advertising we are carrying. In connection with this statement we desire to state that we have not had any advertising representative on the road for nearly seven months; in other words, after six years of hard work "Better Fruit" has succeeded, and is now universally conceded to be the best fruit growers' paper published in the world. We have the confidence of both fruit grower and advertiser because we have got results.

Associations and Co-operation.—The problem of marketing fruit is now commanding serious thought and thorough consideration by every fruit grower in the Northwest. The pros and cons are being discussed by everyone, and with the amount of attention that is being given to this subject it seems fair to conclude that the fruit growers, who are an intellectual people, will arrive at an intelligent solution of the problem and improve their methods of selling in such ways as will make marketing conditions more favorable. While a great deal more might be said on the subject at the present time, it seems wise to wait until some consensus of opinion is formed.

My Farewell Car

By R. E. Olds, Designer

Reo the Fifth—the car I now bring out—is regarded by me as pretty close to finality. Embodied here are the final results of my 25 years of experience. I do not believe that a car materially better will ever be built. In any event, this car marks my limit. So I've called it My Farewell Car.

My 24th Model

This is the twenty-fourth model which I have created in the past 25 years.

They have run from one to six cylinders—from 6 to 60 horsepower.

From the primitive cars of the early days to the most luxurious modern machines.

I have run the whole gamut of automobile experience. I have learned the right and the wrong from tens of thousands of users.

In this Farewell Car, I adopt the size which has come to be standard—the 30 to 35 horsepower, four-cylinder car.

Where It Excels

The chiefest point where this car excels is in excess of care and caution.

The best I have learned in 25 years is the folly of taking chances.

In every steel part the alloy that I use is the best that has been discovered. And all my steel is analyzed to know that it meets my formula.

I test my gears with a crushing machine—not a hammer. I know to exactness what each gear will stand.

I put the magneto to a radical test. The carburetor is doubly heated, for low-grade gasoline.

I use nickel steel axles with Timken roller bearings.

So in every part. The best that any man knows for every part has been adopted here. The margin of safety is always extreme.

I regard it impossible, at any price, to build a car any better.

Center Control, Finish, etc.

Reo the Fifth has a center, cane-handle control. It is our invention, our exclusive feature.

Gear shifting is done by a very slight motion, in one of four directions.

There are no levers, either side or center. Both of the brakes operate by foot pedals. So the driver climbs out on either side as easily as you climb from the tonneau.

The body finish consists of 17 coats. The upholstering is deep, and of hair-filled genuine leather. The lamps are enameled, as per the latest vogue. Even the engine is nickel trimmed.

I have learned by experience that people like stunning appearance.

The wheel base is long—the tonneau is roomy—the wheels are large—the car is over-tired. Every part of the car—of the chassis and the body—is better than you will think necessary. No price could buy anything better.

Price, \$1,055

This car—my finest creation—has been priced for the present at \$1,055.

This final and radical paring of cost is considered by most men as my greatest achievement.

It has required years of preparation. It has compelled the invention of much automatic machinery. It necessitates making every part in our factory, so no profits go to parts makers.

It requires enormous production, small overhead expense, small selling expense, small profit. It means a standardized car for years to come, with no changes in tools and machinery.

In addition to that, by making only one chassis we are cutting off nearly \$200 per car.

Thus Reo the Fifth gives far more for the money than any other car in existence. It gives twice as much as some.

But this price is not fixed. We shall keep it this low just as long as we can. If materials advance even slightly the price must also advance. No price can be fixed for six months ahead without leaving big margin, and we haven't done that. The cost has been pared to the limit.

Catalog Ready

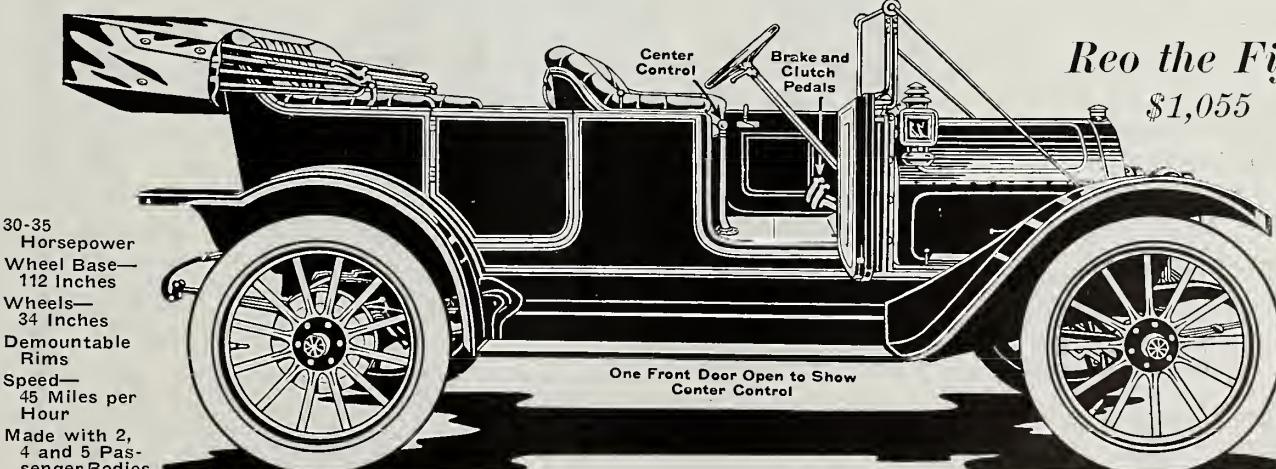
Our new catalog shows the various styles of body. It tells all the materials, gives all specifications. With these facts before you, you can easily compare any other car with this Reo the Fifth.

If you want a new car you should do that. Judge the facts for yourself. Don't pay more than our price for less value. After 25 years spent in this business, here is the best car I can build. And the price is \$1,055. Don't you think you should know that car?

Write now for this catalog. When we send it we will tell you where to see the car. Address

R. M. Owen & Co., General Sales Agents for **Reo Motor Car Co., Lansing, Mich.**

Canadian Factory, St. Catharines, Ontario



Top and windshield not included in price. We equip this car with mohair top, side curtains and slip-cover, windshield, gas tank and speedometer—all for \$100 extra.

SELF STARTER, IF WANTED, \$25 EXTRA

Reo the Fifth
\$1,055

Although "Better Fruit" is exclusively a fruit growers' paper, it admits and recognizes that there are many opportunities for other kinds of farming which will pay a splendid profit on the investment, and while "Better Fruit" does not believe that less publicity should be given the fruit business, it does believe that more publicity should be given to general farming, grain, hay, vegetables, dairying, etc. The railroads, which are splendid developers, have long realized the importance of other lines of farming than fruit growing, and are issuing special booklets on each particular kind of farming, which can be secured by addressing the advertising departments of the railroads operating throughout the Northwest.

The canned, evaporated and dried fruit in California amounted to approximately \$28,000,000 last year, which is probably more than the entire fruit crop of Oregon, Washington and Idaho. From this an object lesson seems clear. Every district should work to secure good canneries and good evaporators. By not doing our share in this line we are losing a great big volume of business. Much fruit can go to the cannery and good prices be obtained, but which is not in a condition for long distance shipment. Such fruit as can be utilized in this way, which cannot be shipped, is just so much money saved, which is equivalent to so much money made.

Investigations made by G. Harold Powell in the orange industry establish the fact that 90 per cent of the off condition of fruit on arrival was due to rough or improper methods of handling. The investigations of Mr. Powell in the orange industry present a conclusion that should command the attention of every fruit grower in the Northwest, or anywhere in the United States for that matter, who is engaged in raising, handling or shipping either deciduous or pomaceous fruits.

C. L. Smith, formerly of Spokane, and for many years engaged in farmers' institute work throughout various sections of the United States, has accepted a position with the Oregon-Washington Railroad & Navigation Company as its agriculturist. Mr. Smith is an enthusiast and loves his work, and it goes without questioning that his best efforts will be spent in improving the farming conditions in general throughout the Northwest.

"The Lands of Utah" is the title of a valuable booklet just issued by the passenger department of Denver & Rio Grande Railroad. It contains a description of Utah's agricultural development and makes special mention of the principal private and government reclamation projects now under way and completed; is handsomely illustrated with orchard and dairy scenes, and an up-to-date map of the State of Utah, giving counties, adds materially to the value of the publication.

The demand for educated horticulturists has been so great in the fruit industry throughout the Northwest that the experiment stations at Pullman, Washington, Corvallis, Oregon, and Moscow, Idaho, have been unable to supply the men as fast as needed.

Editor Better Fruit:

Please find enclosed my check for renewed subscription to your valuable paper. You can rest assured "Better Fruit" is the paper that will do most good in this section, and all fruit growers would be benefited a great deal more by your publication than any that I have subscribed for or have read. One can scarcely do without it. Your very truly, M. M. Murtough, Twin Falls, Idaho.

Below is a fac simile of diploma, blue ribbon, highest award over all competition at the Salem State Fair, 1911, to the Reiverson Machinery Company, on the Reiverson Triplex Power Sprayer. The Reiverson Machinery Company of Portland, Oregon, are selling their sprayer direct to the fruit grower, thereby making a great saving in price, as there is no middleman's profit, it being a sale direct from the manufacturer to the consumer.



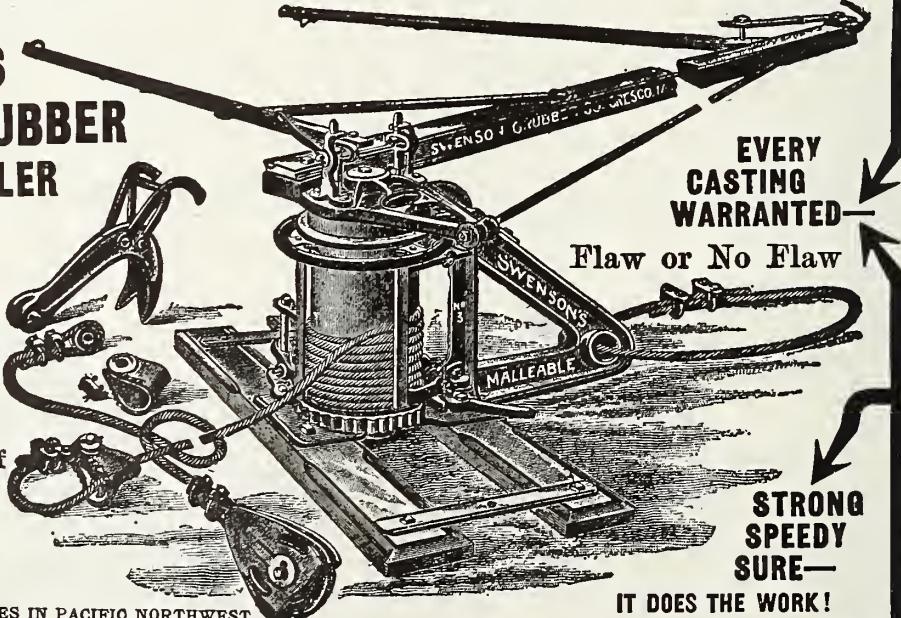
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TO FIND A GRUBBER EQUAL TO SWENSON'S MALLEABLE GRUBBER AND STUMP PULLER

It saves Time.
It saves Man-Labor.
It will make you Money.
It will convert a useless piece of stump-ridden land into a profitable and productive one, without the tedious, back-aching labor of the old processes.

No Chance for Disappointment
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FOR SALE BY OVER 200 AGENCIES IN PACIFIC NORTHWEST
CATALOG GIVES COMPLETE DESCRIPTION OF MACHINE



IT DOES THE WORK!

Our endorsements will tell you a frank story of what has been done. Write for them and FREE CATALOG. Use postal or coupon.

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OLD ESTABLISHED IMPLEMENTS, VEHICLES UP-TO-DATE
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GREATER CASE 40

Backed by a 70-Year-Old Reputation

This car we regard as the crowning achievement of a company which for seventy years has stood at the head of manufacturers of the highest type of machinery. It is a quality product from first to last and, by all standards of comparison, the greatest value in an automobile on the market today. The Greater Case is great in size and magnificent in appearance. It has all the elegance and style and luxurious comfort of cars that cost a fortune. But the dominant factor in its supremacy is hidden under the hood.

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"The Car With the Famous Engine"

Our Mighty Engine

The Case is known far and wide as the car with the famous engine. This engine embodies advanced ideas found in no other make—ideas that have been worked out with consummate skill and infinite care and patience.

It took eighteen years to perfect the engine that makes the Case supreme.

These eighteen years, devoted to designing, experimenting, refining, improving and perfecting this wonderful engine, have brought forth what we believe to be the masterpiece of America.

An engine so simple, compact, silent, accessible and powerful that its equal does not exist.

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The Greater Case is big and roomy, with a straight line body and sweeping lines that give symmetry and grace. It is richly finished and upholstered, handsomely trimmed, luxuriously appointed, and up-to-the-minute in style.

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And its perfect balance and long, strong springs make it by far the easiest riding car.

Case Cars are always ready to go. The engine always runs.

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Back of Case Cars stands the 70-year reputation of a company whose products have always made good.

J. I. Case machinery was famous for quality when your grandfather was a boy. And for three generations that high standard of quality has steadily been maintained.

You want a car that will *last*—not one that will be down-and-out in a year. We are not competing with the cheap, "one-

The Case Eagle on Your Car

This emblem on an automobile has the same significance as the STERLING MARK on silver. It stands for highest quality and a guarantee that protects, if places at the disposal of the owner of a Case Car our

Nation Wide Case Service

We have 10,000 Case Agents and 65 big Branch Houses scattered throughout the United States and Canada. All of our vast army of agents are equipped to promptly take care of Case Cars.

Wherever you carry the Case Eagle you may be assured of a welcome, hospitable treatment and fair dealing at the hands of the Case local agent. He will furnish you with information on the best roads, hotels, etc. No other automobile concern in the world can duplicate Case Service.



year" cars with which the market is flooded.

The Greater Case is a high-grade car at a medium price. Fore-door ventilation—36 x 4-inch tires—120-inch wheel base—three-quarter elliptic springs—11-inch clearance— $1\frac{1}{2} \times 5\frac{1}{4}$ -INCH CYLINDERS—Rayfield carburetor—dual ignition—Brown-Lipe transmission—Timken full-floating axles—cellular-type radiator—regulation trimmings—demountable rims—English mohair top with side curtain and dust hood.

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High-grade windshield—12-inch acetylene gas head lamps—special design combination electric and oil side and tail lamps—storage battery for the electric lighting side and tail lamps—Prest-O-Lite tank for head lamps—one extra demountable rim—complete set of tools—jack and tire-repair kit—pump. These are some of the special features that belong to the Greater Case.

The Safe Way

to buy a car is to deal with a concern in whom you have absolute confidence. You know this company. You know the J. I. Case 70-year reputation for fair dealing and honest values.

We want you to know the Greater Case. Send the coupon for the catalog. See the car at the nearest Case Agency. Compare our quality and prices with others.

Ride in it—at our expense—as fast and as far as you wish. At the rate the orders are coming in, we will not be able to meet the 1912 demand for GREATER CASE 40 cars. Better act at once. Send the coupon today. If you want a lighter, less powerful car, investigate the well-known Case 30.

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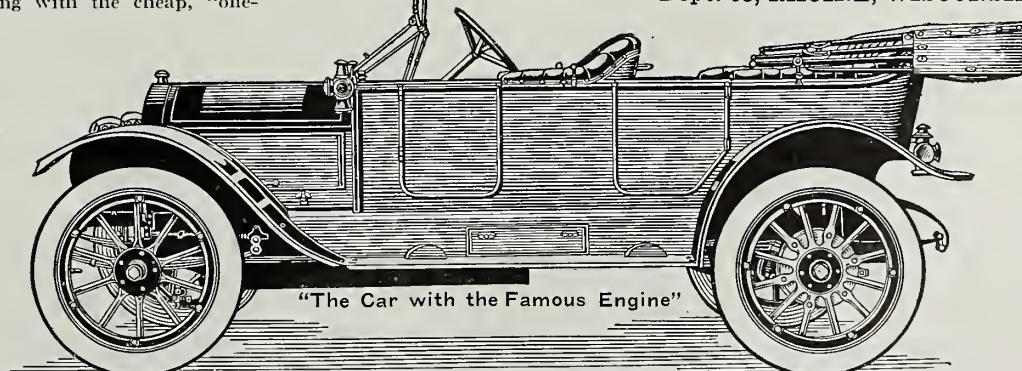
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Self-Starting
Motor

Pedigree Trees and Selected Strains Not the Same

By C. F. Whaley, Hanford, Washington

PEDIGREE TREES! Selected Strain! Trees of Selected Pedigree! Your literary critic would say that the terms are not synonymous. Your orchardist, with keen commercial instincts, would say a distinction without a difference. Either criticism might in the abstract be correct. But there is a difference, not alone literally but actually, and I will endeavor, in this brief article, to point it out without discussing the proper or improper use of the terms. The now generally accepted term "pedigree trees" is distinctly descriptive as applied to fruit trees. Any fruit tree of proven strain which bears fruit of a high quality and color should be eligible to the pedigree class, provided it is healthy, hardy and free from diseases at the time that the scions or buds are cut from it and certified. To illustrate, we will say: Mr. A owns an orchard. He picks apples from the orchard and puts them on exhibition at the National Apple Show. The variety is the Spitzenberg. He complies with the rules governing the contest and the high quality of his fruit wins for him first or second prize for the variety. The trees from which Mr. A has picked this fruit are trees of pedigree, and the scions and buds cut from these particular parent trees should be entitled to be

put in the pedigreed class, provided that on the respective dates of cutting they are reliably certified and a record of them and the orchard from which they are taken entered in a tree book or register, the certification being done under affidavit. Such trees propagated in this manner insures the planter that he will get fruit of a very high quality if they are properly cared for and cultivated, and fruit with all the earmarks and hereditary characteristics of the parent tree.

One might argue that the orchard which is a prize winner this year might pass into the hands of another who is not proficient in horticulture and become pest-ridden and diseased in a couple of years. This is very true, and for this reason it is necessary that the quality and pedigree be certified to yearly after the fruit has been inspected while on the trees and the fittest trees selected for propagating and pedigreeing, or after the recognized authorities have awarded prizes of merit for fruit borne by these trees. There are many good orchards with trees of proven quality growing in them, producing fruit that is in every way superior, whose owners never exhibit. In cases of this kind the certificate of pedigree should state the age of the trees, color of the fruit, shape of the fruit, etc., etc., and should set forth the fact that the trees are healthy and free from all disease. These certificates should be attested and sworn to by a graduate horticulturist and certified by the owner of the orchard. This system of certification insures the planter that he is getting pedigree trees of the particular variety which he desires. Of course, all these precautions would not secure the purchaser against error while grafting, planting and digging trees in the nursery if the particular nurseryman or grower of the grafts is not fortified by an identification system, which would make the probability of error very remote, or a system that, when a mistake is made, it would be apparent to the shipper, or to the planter, after he had received the trees, and easily rectified.

Of course, all this, one would say, is according to good business methods. It is, and it is assumed that it is practiced by all good nurserymen growing pedigree trees. Breeding and propagating animals and plants by selection is an acknowledged advantage to breeders and growers who are making a success of their respective callings. The man who plants selected pedigree trees in his orchard will reap many times the difference in the price paid for the young trees. It is in line with the best horticultural practices, the best thought of the best thinkers and the best acts of the men who do things, and should be a strong factor in sustaining the reputation now enjoyed by the Northwestern fruit growers; that is to say, growing better fruit in all that the words imply.

YAKIMA COUNTY HORTICULTURAL UNION

North Yakima, Washington

C. R. Paddock, Manager

Apples, Pears, Peaches, Cherries
Plums, Prunes, Apricots, Grapes
and Cantaloupes

Mixed carloads start about
July 20. Straight carloads in
season. Our fruit is the very
best grade; pack guaranteed

We use Revised Economy Code

Why Bother with Irrigation?

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YOU CAN BUY CHEAP

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Jobbers of all Farm and
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We have a large outlet for fruits
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from shippers.

A. J. KNIEVEL
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Sixteen years' experience on the
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Packers and Shippers of
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Finest flavored—Longest keepers

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Fruit Growing and Bee Keeping

Learn what an ideal combination it makes. "Gleanings in Bee Culture" tells all about it. Six months' trial subscription 25c. 64-page book on Bees and supply catalog free.

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High grade fruit demands a high grade box. Our Western Soft Pine boxes are best. Light, bright, strong, well manufactured.

THE NEW PANEL END BOX

This is the coming box. It is lighter, more easily handled and more handsome than the solid end, and is fully as strong. Send for a sample end.

Capacity 15,000 boxes daily

WASHINGTON MILL COMPANY
SPOKANE, WASHINGTON

Fuel Economy in Orchard Heating WITH BOLTON Orchard Heaters

MR. GROWER: The Bolton Orchard Heater with **Combustion Regulator** attached is guaranteed to burn more than twice as long on the same amount of oil than will any other device on a like amount of oil.

Bolton Orchard Heater

Size, 1 gallon

Cost, 20¢ each

Burning time, 8 hours

Look! 1 gallon consumed in

8 hours



Lard Pail

Size, 1 gallon

Cost, 14¢ each

Burning time, 3 hours

Look! 1 gallon consumed in

3 hours

Now, Mr. Grower, by installing BOLTON ORCHARD HEATERS you save from 1½ gallons to 2 gallons of oil every 8 hours you burn them. Figuring oil at 5 cents per gallon, you save 10 cents on each Bolton Orchard Heater, and by installing lard pails you lose 10 cents on each lard pail every 3 hours. Think it over and listen to us, as we are the ORIGINATORS of Orchard Heaters.

Prices: 1-gallon size, Black Iron, 20¢ each

1-gallon size, Galvanized, 23¢ each

2-gallon size, Black Iron, 26¢ each

2-gallon size, Galvanized, 30¢ each

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Main Office, Bank of Italy Building

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Harding-Shaw Company, 2 South Clark St., Chicago, Illinois

Bolton Orchard Heater Company of Texas, 406 Chronicle Building, Houston, Texas

Robert Beers, R. F. D. No. 46, Roswell, New Mexico

The Frost Prevention Company, 107 S. Broadway, Los Angeles

The Frost Prevention Company, 109 Temple Block, Kansas City, Missouri

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The Troutman Orchard and Ground Crop Heaters

equipped as shown in cut will protect your strawberries, grapes and raspberries from killing frosts or freezes just as effectively as they will your apples, pears or peaches.

Time is flying, spring is fast approaching. Your fruit will soon be in danger.

If you expect your crop to be worth harvesting equip to fight the one great enemy, FROST.

EQUIP WITH THE SIMPLEST, SUREST AND MOST ECONOMICAL SYSTEM.

The Troutman Orchard Heaters have many successful years behind them.

UNANIMOUSLY RECOMMENDED WHEREVER USED.

Send for our free booklet on orchard heating now.

THE ROUND CREST ORCHARD HEATER CO.
CANON CITY, COLORADO



Recent Progress On The Great Apple Way

August Wolf, in Pacific Builder and Engineer

THE Spokane County Good Roads Association, which is to supervise the work of building "The Great Apple Way," has about cleared away all obstacles to beginning activities. A settlement has been effected by the county commissioners with the railroad, the track of which was to have crossed the road five times, but will now cross it but once. The road is to be more than thirty miles long and is to extend from Spokane to Coeur d'Alene, Idaho. Bisecting one of the most fertile irrigated fruit districts in the Inland Empire for thirty-one miles,

The highest types of apple in the world today are the Hood River Spitzenberg and Yellow Newtown Pippin; the highest type today to Hood River's cosmopolitan people of a life insurance policy is a Policy of the National Life Insurance Company of the United States of America, of Chicago.

These Policies, which hundreds of your neighbors have, make superb Christmas presents, Happy New Year gifts, appropriate wedding presents, choice birthday reminders and unexcelled anniversary tokens.

Write for information to the Agent at Large, Dr. James H. Shults, Hood River, whom most of you know, quote "Better Fruit," and full and satisfactory information will be furnished and hurry orders will receive prompt attention by telegraph and special delivery letters.

the roadway, sixty feet in width, will be built of macadam with an asphaltum binder. Every mile will be of standard construction and properly crowned and drained, with fountains for man, dog and horse placed at intervals of a mile. The material for the fountains is a mixture of concrete and granite filings, making a beautiful finished stone effect equal to granite. The feature will be the planting of apple trees forty feet apart on both sides of the roadway, these being alternated with English elm trees which afford ample shade, at the same time withstanding the common pests which work havoc among the American shade trees not native to the district. The Spokane County Good Roads Association, of which J. A. Perry is secretary, will supervise the road work, and the trees will be planted by the orchardists living along the line of the road. Planting will begin early in May. Funds for the building of the road will be obtained through an assessment district, acting in much the same manner as a city improvement levy. Members of the legislatures of Washington and Idaho, as well as the road supervisors of the several townships through which the road runs, have already declared themselves in favor of the road, and will become actively engaged in the promotion of the enterprise. The cost is estimated at \$10,000 a mile.

Hood River Nurseries

Have for the coming season a very complete line of
Nursery Stock

Newtown and Spitzenberg propagated from selected bearing trees. Make no mistake, but start your orchard right. Plant generation trees. Hood River (Clark Seedling) strawberry plants in quantities to suit

SEND FOR PRICES

RAWSON & STANTON, Hood River, Oregon

WE CLUB THE SEMI-WEEKLY JOURNAL with "Better Fruit" for \$1.75 per year

The Oregon Journal is one of the big publications of the City of Portland and is well known to all people of the Northwest as being one of the live and interesting newspapers. We believe everybody who takes advantage of this clubbing offer will get more than value received.

Genasco

The TRINIDAD-LAKE-ASPHALT
ReadyRoofing
"Dead or alive?"

Which has greater strength and resisting power—a dead tree or a live one?

Every man who answers that question right knows why Genasco stays waterproof. The natural oils of Trinidad Lake asphalt give Genasco its *lasting life*.

Mineral or smooth surface, several weights. Genasco comes in rolls ready to lay—no experience needed. Ask your dealer for Genasco. Write us for the illustrated Good Roof Guide Book and samples—free.

Ask for the Kant-leak Kleet packed in the roll of smooth surface roofing. It makes the seams water-tight without cement, and prevents nail leaks.

The Barber Asphalt Paving Company
Largest producers of asphalt, and largest manufacturers of ready roofing in the world

Philadelphia
New York San Francisco Chicago



OUR EXPERIENCE WILL SAVE THE BUYER MONEY
Charles R. Bone—J. E. Montgomery
 ORCHARD LAND BROKERS
 HOOD RIVER

WHITE SALMON, WASHINGTON

Owner has 185 acres. From this will sell one MODERN RESIDENCE AND ABOUT 35 ACRES. Also 40 acres in 5 and 10-acre tracts. TERMS TO SUIT. These I will sell under a guarantee to REFUND MONEY IF PURCHASER IS NOT SATISFIED AFTER A THREE YEARS' TRIAL. NO STRINGS TO THIS. I am starting a new residence opposite the one I will sell. Location is 2½ miles from Columbia River.

EUGEN KUHNE, White Salmon, Washington.

ORCHARD FOR SALE

Having more land than we can properly handle, we wish to sell part of our beautiful orchard, located 2½ miles from R. R., in the

WHITE SALMON VALLEY
 having rich red shot soil, fine spring water, magnificent view and well-cared-for trees. We will divide to sell either—

No. 1—15 acres; 8 in young pears, 2 in mixed bearing orchard. Attractive modern house and fair outbuildings.

No. 2—65 acres; 14½ in young apples, 4½ in bearing apples and peaches, 1½ in hay, 10 uncleared good fruit land, balance rough. No buildings.

For further particulars address

BEAR SPRINGS RANCH
 UNDERWOOD, WASHINGTON

Tree Time

This is a mighty good time to decide on your wants in the tree line for the coming spring planting.

If you're just a "home planter" and want only sufficient fruit trees for your home orchard for family use, it's all the more important that you decide now while the assortment is larger than later on when the heavy selling cuts down the varieties.

If you're an orchardist, looking for solid blocks of first-class trees, now's your time to buy, when we can assure you of the quantity and the varieties.

And in either case, having decided on the kinds and quantities, it's to your interest to place your order with an established nursery that is in business to stay, that knows the business from A to Z, and that has the management and the system to guarantee to its customers that their orders will receive proper attention, and that the stock will be true to label and in prime condition for planting.

Every detail of our business is under the management of members of the firm, and our highest desire is to serve our customers. We'd rather not accept your order than to fill it wrong. Our thousands of satisfied customers are our best asset.

Our salesmen reach all localities. If they fail to see you at once, drop us a line.

Washington Nursery Co.
 TOPPENISH, WASHINGTON

More salesmen needed for some good unoccupied fields.

Contracts have been signed by the officers of the Spokane Canal Company to furnish water necessary for the irrigation of the trees for a period of five years without cost to the county or state, and each property holder along the right-of-way is a self-appointed custodian, caring for the trees and also assisting in the maintenance of the roadway until such time as it is taken over by the state. The route of the proposed highway follows the Trent road from Spokane through Trent, Otis Orchards, East Farms, Post Falls and on to Coeur d'Alene, passing through one of the most picturesque valleys in the world. It will connect Spokane with the summer resort on Lake Coeur d'Alene, and when completed it will be the finest pleasure drive in the United States.

Governor Brady of Idaho and Governor Hay of Washington have both expressed earnest interest in the plan, and are pledged to use their personal and official influence in the promotion and maintenance of the novel highway. The commercial bodies of the two terminal cities and in the intermediate towns have indorsed the proposition, and offered every assistance in both moral and financial support of the project. Governor Hay said: "I believe this is one of the greatest plans now on foot in the State of Washington or in the whole world. You have my unqualified indorsement, and if I can be of any service you have but to ask it. I am satisfied that the great highway, as outlined, will be one of the show places of the United States in a few years, and shall do all in my power to assist in its promotion." Governor Brady of Idaho, at a recent reception tendered by the commercial club of Coeur d'Alene, said: "I am greatly interested in the building of this Great Apple Way and shall take opportunity to assist in its building, also in its promotion and completion and its maintenance."

CLUBBING OFFER

We will give the Farm Journal (Philadelphia) for two years (new subscription) and "Better Fruit" one year (old or new) for \$1.25. The Farm Journal is one of the best papers published on general farming in the United States. Any of our subscribers wanting a farm paper will find the Farm Journal valuable and instructive.

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CREATION



The tone is the Jewel.
The case is the Setting.
The combination is the
Steinway—the Perfect
Piano.

HE who is blessed with the power to create is blessed with God's greatest gift to man, and if he uses that power to increase the happiness of his fellow men he becomes a benefactor to the human race.

The world owes homage to the men who have devoted their burning energies to the consummation of one purpose, to the final and most perfect development of an ideal.

THE STEINWAY PIANO

Is an example of the grand result of years of persistent, purposeful striving after the very highest musical ideal. Sons have taken up the task where fathers left off, so that alternate generations of genius, working through the finest piano factory in the world, have evolved the Steinway—a piano that has long since been acknowledged the musical masterpiece of the ages.

Priced at \$575, \$625, \$775 and up to \$1,600. Of course you can buy a piano cheaper, but it will be a cheaper piano.

Why not get the best?

VICTOR TALKING
MACHINES and
SHEET MUSIC

Sherman Clay & Co.
SIXTH AND MORRISON
PORTLAND, OREGON
Exclusive Steinway Representatives

The Pear Thrips, Pest of Deciduous Fruit Trees

Continued from page 33

But the insects are very active at this time, and if they are only disturbed and not killed in the mechanical stirring of the soil they simply find a new place to hide, and perhaps go a little deeper into the ground. From the following evidence, however, it is quite obvious that careful spring cultivation is helpful. A certain row of cherry trees which was badly infested with thrips during 1905 was kept under constant observation for several months because it represented various interesting conditions. The trees bordered a roadway, and were for this reason cultivated only on one side. There was a strip of land perhaps three feet wide extending on either side of the row, which, though uncultivated, was not hardened like the roadway. In February and March, 1905, the trees in question were very badly infested, were stripped of all their fruits and left with pale, ragged leaves. Adults were numerous. Many eggs were

deposited and larvae by thousands matured, dropped down and entered the ground. These larvae were actually seen entering the soil, mostly during the month of April. During April and May they were readily found in the ground several feet from the tree as well as near to its trunk. They were scattered about generally, regardless of cultivation, except that the many individuals which were unable to penetrate the hard gravel road crawled off to the side. They did not go deeper than three or four inches in the uncultivated strip near the trees, while in the well cultivated soil they were often found six or seven inches below the ground surface. They could easily be found anywhere, in April, just after entering the ground. After the spring and early summer cultivating, however, almost none could be found in the deeply cultivated soil, but they were as common as ever in the uncultivated ground. A dozen or more thrips were often collected from a small clod about

an inch and a half in diameter. Small uncultivated areas may be found in almost any orchard, and it is a fact that a few square yards of ground can harbor a very large number of thrips. Cultivation methods, however, as a means of control can only be partially effective at best. One cannot kill all of the thrips in the ground even with the most careful cultivation, and there are always men who cannot, or will not, cultivate at the proper time. Then, too, there are areas along fences, ditches, etc., which can be cultivated only with great difficulty. What is even more important, certain kinds of soils—adobe and clays—can be cultivated only under certain conditions to be kept mellow and loose. The present manner of cultivation in the Santa Clara Valley offers almost ideal conditions for the thrips, in that the insect is left undisturbed during almost the

Do You Want A Home in the Beautiful Ozarks?

of Missouri, in the famous Strawberry Land? Apples, peaches, pears, grapes, raspberries, etc., all grow excellently. Ideal location for the dairy and poultry business.

The winters are mild and of short duration. An abundance of rainfall during the summer months assures plenty of moisture for growing crops.

We offer for sale 60,000 acres of land in 40-acre tracts or more, cheap and on easy terms. Located in Stone and McDonald counties. For further information address

McDonald Land & Mining Company

Rooms 301-2 Miners Bank Building
Joseph C. Watkins, Mgr. JOPLIN, MISSOURI

We are now selling tracts of 5 acres or more in our final and greatest planting at Dufur, Wasco County, Oregon.

5,000 Acres All in Apples

Over 3,000 acres of it has gone, mostly to Eastern people. The remainder will be gone by spring.

We plant and develop for five years, guaranteeing to turn over to you a full set, perfectly conditioned commercial orchard. After the expiration of the five years we will continue the care of your orchard for you, if desired, for actual cost, plus 10 per cent.

Planting and care is under supervision of the

Churchill-Matthews Company

Spalding Building, Portland, Oregon
The largest and most experienced planters in the Pacific Northwest

We will be glad to meet personally, or to hear by mail, from anyone considering the purchase of an apple orchard or apple land. On account of the bigness of the project, everything is done on a wholesale basis and prices for our tracts are proportionately lower. Reasonable terms. All our purchasers are high class people. No others wanted.

Write for booklet, or call on

DUFUR ORCHARD COMPANY

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Profit, Health, Pleasure in the White Salmon Valley

Attention is again called to my 28-acre, NON-IRRIGATED, BEARING apple orchard in this beautiful valley and celebrated apple district.

No finer orchard outdoors; price absolutely attractive! This valley lies in the heart of the Cascade Mountains, with all that that implies in health, pleasure and scenery, and yet in close touch with a metropolis and present day advantages. Retiring merchants are already building their beautiful homes, and ambitious business men planting orchards for the element of profit. With the "North Bank" Railroad (Hill system) 2½ miles away, steamers plying the Columbia to Portland 65 miles distant, where, at a nominal freight charge, five transcontinental railroads and steamers for all ports of the world, become available, the Columbia River fruit district commands shipping facilities nowhere else equaled.

References { 1st National Bank, White Salmon, Washington
Butler Banking Company, Hood River, Oregon
"Better Fruit," Hood River, Oregon

F. MCKERCHER, Owner
240 Stark Street, PORTLAND, OREGON

entire period occupied by the resting stage—from June until the following February. Thrips are in the ground all of this time, and for the most part within reach of the cultivator, but they mature and arrive on the trees in March and April, before spring cultivating is begun.

The pear thrips is largely protected from ordinary predaceous and parasitic insects because it spends so long a time

hidden away in the ground. A successful parasite must in a way parallel the life of its host, and we have found no insect which thus follows the pear thrips. Raphidians, or snake flies, their commonest enemies in the Santa Clara Valley, feed rather on the younger forms than on the fully developed insects, and they do not appear early enough in the spring to constitute an effective check to the pest. To be com-

petent thrips killers they would have to feed on other insects for perhaps ten months in the year and then, when thrips appear, suddenly change their diet, and later, after thrips have gone into the ground, as suddenly change back again to aphides or to something else. Such feeding habits are not to be expected in a predaceous species. Ants were at one time thought to be doing much good as an enemy of the thrips. A certain orchardist brought in an ant with a thrips impaled in its jaws—the evidence complete. After a careful investigation, however, it was found that only a very small percentage of ants were actually killing thrips. Four hundred ants were examined as they descended a thrips-infested tree. Twelve of these carried something in their jaws, and only four of these objects were thrips. Thus only one per cent of the ants on the tree were actually killing thrips and carrying them down. It has been a common observation among orchardists, however, that thrips are not common where ants are unusually abundant. Spiders and mites are active enemies of thrips. In some of our breeding cages almost all of the thrips would at times be killed by some small spider or mite which had gained an entrance. The writer has observed a red mite (Rhynchocephalus sp., determined by Mr. Nathan Banks) actively engaged in feeding on the onion thrips (Thrips tabaci Lind.). Both the thrips and the mite were very common in large onion fields, covering several hundred acres. A mite would be seen to approach and grasp a thrips with its front pair of legs and, inserting its proboscis, suck out the body juices of its prey. A single mite was often observed thus to kill several thrips within a very few minutes. The writer

VIRGINIA·APPLE·ORCHARDS



\$350.00 on long time and easy payments buys a ten-acre Apple Orchard tract in "The Beautiful Shenandoah Valley of Virginia." Other farm and fruit lands \$15.00 per acre and up. Write now for last issue "The Southern Homeseeker," other interesting literature and low excursion rates. Address, F. H. LaBaume, Ag'l Agt., Norfolk & Western Ry., Box 3047, Roanoke, Va.



The Best Farm Locations

Productive lands, favorable climate, and abundant rainfall make farm locations in the Southeast the most profitable.

Land from \$10 to \$50 an acre close to the best markets. Wheat, corn, hay, all truck crops, give best returns. Conditions unsurpassed for dairying and live stock, hog and poultry raising. Beef and pork produced at 3 to 4 cents a pound.

Five to six crops of alfalfa per season grown. Good farmers make 60 to 100 bushels corn per acre. Home markets near at hand pay highest prices for dairy products and demand is undersupplied. Apple orchards pay \$100 to \$500 an acre, and orchard lands cost only a fraction of those in other sections.

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The climate assures the finest results from intelligent agriculture, and makes the region unsurpassed as a pleasant and healthful home location. It is an open winter country, and its summers are enjoyable. You can locate where there are good schools, churches, roads, rural delivery, and all other advantages. The Southern Railway and associated lines will help you find the location you desire. Our several publications, free on application, give full information. Address,

M. V. RICHARDS, Land and Industrial Agent, Southern Railway,
Room 13 1320 Pennsylvania Ave., Washington, D. C.



Authentic Information

REGARDING HOOD RIVER VALLEY

We will be glad to furnish you with full details of our valley and give you a list of what we have for sale in improved and unimproved land. At the present time we have some desirable buys. Will send you literature on request.

Reference: Any bank or business house in Hood River.

Guy Y. Edwards & Co., Agents
HOOD RIVER, OREGON

WESTERN CANADA, LAND OF OPTIMISM

No other portion of the world is developing so rapidly or offers such splendid opportunities to business and professional men, settlers and investors, as Western Canada. Seventy-five millions expended last year in railroad building, and one hundred and eighty-three new towns placed on map. Last year's building permits in Western Canadian cities and towns broke all previous records. Phenomenal increases in population of cities and towns are the rule, and annual increases of 100 per cent and more in realty values are common. Write to authorized agents of the Great Transcontinental Railway, Grand Trunk Pacific, for particulars, maps, etc., addressing your letter to International Securities Company, Ltd., Somerset Building, Winnipeg, Manitoba.

strongly suspects that some mite preys on the younger stages of the pear thrips while it is in the ground. This would be entirely possible, and mites are commonly found in the grass and in the ground.

A fungus, presumably parasitic, has been endemic among thrips during the seasons 1905 and 1906. In its different stages it lives on both young and mature thrips, and in a way parallels the life of its host. During the spring of 1905 thrips larvae were often observed to be thickly infesting a tree, and after these had disappeared, presumably having gone into the ground, none, or but few, living ones could be found. Many larvae, too, seemed to leave the tree before they had reached full growth, and within breeding cages these larvae were seen to die as the direct result of the parasite. Projecting from their bodies were to be seen the tiny fruiting conidiophores of the fungus. Adult thrips were seen to be attacked by another form of the parasite during the spring of 1906. The past two seasons have offered almost ideal conditions for the development of the fungus, enabling it to become quite widespread. The life history of the fungus has been determined only in part. The heavy walled resting spores, the dormant stage, are found within larvae and adults in the ground; never, thus far, in pupae in the ground or in individuals on the tree. Dead larvae from the ground show that the internal body organs have all been displaced by the fungus, and in most cases the body contains only a mass of the heavy walled spores. The transition which takes place in the formation of these spores is as yet not clear, but there seems to be a general breaking up of the fungus hyphae within the thrips' body. In one well prepared specimen there was an indistinct grouping of particles around many centers. These were presumably the forming spores, for in the next stage the formation of such spores was complete. These heavy walled spores may be found nearly the whole year through, although they are especially abundant from May until the following February.

In the conidiophore stage on the tree the fungus hyphae break forth in groups from between the body segments and extend out as long slender threads, which in turn branch and form numer-

\$3,000 FOR 35,000

WERE YOU MISSED?

The Routledge Seed & Floral Company, of Portland, Oregon, write us that they have just finished mailing the 1912 edition of their complete Annual and Seed Planters' Guide at a cost of over \$3,000.00. This new catalogue, copy of which we have just received, is certainly a credit to this young and enterprising company.

It contains 112 pages of valuable and up-to-date matter, of vital interest to the Western planters of seeds, plants, roses, fruit and ornamental trees and shrubs, and the buyers of fertilizers, sprays and spray pumps, garden and farm tools, incubators, brooders, poultry supplies and foods.

We hope every reader interested in gardening, poultry raising or horticultural work will send for a copy, for this is a Western catalogue for Western buyers and well worth reading. A post card will do. Write today and mention this paper.*

Horse Secrets and Horse Sense

A Liberal Supply of Both for a Dollar

The "Horse Secrets" are told by Dr. A. S. Alexander, the celebrated veterinarian, in a book of that name. This book is the only one in existence which exposes all the tricks that unscrupulous horse dealers and "gyp" traders are up to—such as "shutting a heaver" and "plugging a roarer," the "Bishoping" Trick, the "Widow Dodge" and all the other ways of "fixing" a horse. Saves you from being "stung" by professional dopesters, and gives you the laugh on these slick scamps. Also contains many valuable secrets for feeding and conditioning stock, curing evil habits, etc.

Seven editions of "Horse Secrets"—75,000 copies in all—have been distributed by Farm Journal in the past two years, to the great discomfiture of horse-trading swindlers. We will send out many thousand more this winter.

"Horse sense"—as applied to farming, fruit growing, poultry raising, stock breeding and household economy—is imparted through the pages of Farm Journal.

Edited by men who, most of their lives, have had roosters for alarm clocks and learned farming by making a living at it, there's no flub-dub or hothouse theory in Farm Journal—just sound, practical, common-sense teachings which are coined into cash by those who study and apply them.

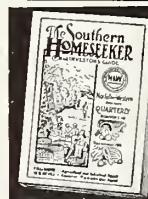
If you ever buy, sell, trade or own a horse, you need Horse Secrets, and in whatever branch of farming you are engaged you need Farm Journal. They will save and earn you many dollars—yet

For only \$1.00, we will send you "Horse Secrets," postpaid, at once, and Farm Journal every month for four years.

This is the most liberal combination offer (quality of book and paper considered) ever made. You'll do wisely to take advantage of it today.

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A YEARS' SUBSCRIPTION FREE

We will send you free, a years' subscription to this beautifully illustrated magazine "THE SOUTHERN HOMESEEKER"—issued quarterly—if you will only send us the name of a friend whom you think would be interested in Virginia. It is regular magazine size, with colored covers and tells all about the wonderful opportunities in Virginia and the South, with their high-grade fruit and farm lands at \$15.00 an acre and up. Write both addresses plainly and mail to-day.

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Box 4026 Roanoke, Va.**



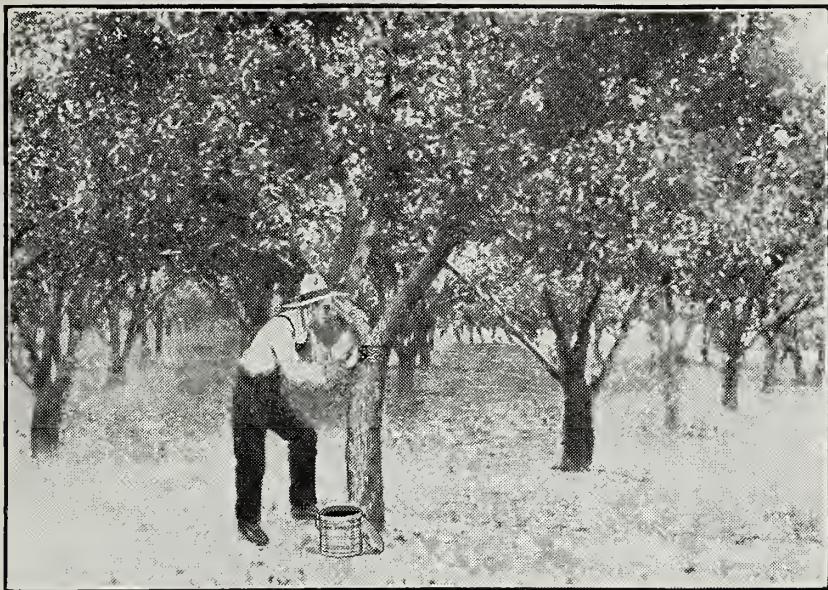
Fruit Thinning Shears

Improved Pattern

LET US BOOK YOUR ORDERS NOW TO INSURE
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40 cents each, \$3.90 per dozen, postpaid

E. A. FRANZ CO., Hood River



TREE TANGLEFOOT A harmless, sticky substance applied directly to tree trunks. Remains effective rain or shine three months and longer, fully exposed to weather. One pound makes about nine lineal feet of band. No apparatus required; easily applied with wooden paddle. Especially recommended against gypsy, brown-tail and tussack moth caterpillars, bag worms, canker worms and climbing cut worms, but equally effective against any climbing pest. Tree Tanglefoot needs no mixing. It is always ready for use. Do not wait until you see the insects. Band your trees early and get best results. Prices: 1-lb. cans 30c; 3-lb. cans 85c; 10-lb. cans \$2.65; 20-lb. cans \$4.80. THE O. & W. THUM CO., Grand Rapids Mich., Mfrs. of Tanglefoot Fly Paper and Tree Tanglefoot. Send for Booklet.



INCREASED TRAIN SERVICE BETWEEN Chicago and the North Pacific Coast

North Coast Limited

Operates from and to Chicago and Milwaukee, via North Western-Northern Pacific Lines.

Using new C. & N. W. Passenger Terminal, Canal and Madison Streets, Chicago.

Standard Drawing Room and Compartment Sleeping Cars, Tourist Sleeping Car, Coach, Dining Car and Observation-Library Car, with barber and bath—all electric-lighted.

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Write for illustrated booklets about the trip through the Storied Northwest and to Yellowstone National Park and full information about Low Summer Tourist and Convention Fares for 1912

Only Line to Gardiner Gateway, Official Yellowstone Park Entrance
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Golden Potlatch Carnival, Seattle: July 15-20, 1912
Panama Pacific International Expo., San Francisco: 1915
Montmara Festo, Tacoma: June 30-July 4, 1912

Northern Pacific Ry.

A. D. CHARLTON, Asst. Gen'l Pass'r Agt., PORTLAND, OREGON

One-Way Colonist Fares from the East
March 1 to April 15

ous fruiting organs. This stage of the fungus has been taken only from adult thrips on the tree and not from the larvae, and it has been found present almost everywhere that the pear thrips has been collected. There is no doubt that the fungus spends a part of its life on the tree and a part in the ground, the rapidly fruiting stage among the active thrips and the heavy walled dormant stage within the hibernating individuals in the ground; but we can only surmise how it is carried from one to the other. The bodies of the larval thrips within the ground are all absorbed by the fungus, and naturally, therefore, the spores must be carried to a new host before they can germinate to any great extent. We have found adult thrips in the ground whose dead bodies contained only a few spores and others which developed some of the external mycelial growth within their cells. If this were often the case, and these individuals in the ground produced fruiting spores as they do on the trees, it would be an easy matter for healthy individuals in coming from the ground to become accidentally infested and to carry the parasite up to the tree where, because of the gregarious habits of the insect, it would spread rapidly. The fungus grows readily in the nutrient agar under ordinary conditions and seems to retain its virulence, and can be transferred from cultures to the living thrips. The fungus may prove to be a check for the pear thrips, but its effectiveness is uncertain because it is so subject to climatic conditions.

Almost the whole world knows of Hood River as a place that produces the best fruits, and all of Hood River Valley should know, and could know, that there is one place in Hood River, under the firm name of R. B. Bragg & Co., where the people can depend on getting most reliable dry goods, clothing, shoes and groceries at the most reasonable prices that are possible. Try it.

The Northwest has introduced and developed the system of packing to a high state of perfection. Many experiments have been made by different growers in the different sections with a view to simplify the process of grading apples. Such a thing as a machine for this work was not conceived as being possible. Growers find that the cost of grading is several cents per box, ranging in price according to the quickness and pay of the man doing the work. Mr. N. C. Schellenger of Salt Lake City, Utah, has invented a machine which he demonstrated in a practical way at Hood River last fall. The demonstration was watched with the keenest interest by all of the growers present, and the general opinion seemed to prevail that the machine was a success without any doubt. Schellenger's advertising has been in several issues of "Better Fruit," and growers in any section of the country can get full and thorough descriptive matter pertaining to the Schellenger Fruit Grading Machine by addressing the Schellenger Fruit Grading Machine Co., 633 South Fourth West Street, Salt Lake City, Utah.*

YAKIMA VALLEY INSTITUTES

The superintendent of farmers' institutes for the Washington State College announces a series of farmers' institutes through the Yakima Valley as follows: Benton City, February 19 and 20; Grandview, February 20-22, inclusive; Sunnyside, February 21-23, inclusive; Toppenish, February 22-24, inclusive; North Yakima, February 23-24-26, inclusive; Ellensburg, February 24-26-27, inclusive.



The CUSHMAN The World's Best Power Sprayer

Save \$25 to \$40 By Placing Order Early

More orchardists will spray Right this year than ever before—because more of them will use a CUSHMAN. A good many experiment first with a small, inefficient machine, get a taste of the extra profit and then get CUSHMAN and do it thoroughly—and get Enormous Profits. The demand for Fine Sprayed Fruit is unlimited and the price high. You can hardly sell poor quality. Fruit Growers are just like other folks—they wait until the last minute and then want a sprayer awful bad. Now we want to furnish you with sprayers; that's our business. We make the Best Sprayer in the World—no two Absolutely the Best, the one you ought to have. We have and prize—have always won the First Prizes and Gold Medals

Peru, Nebraska
Mr. L. W. Cushman, President
Cushman Power Sprayer Co.
Dear Sir: The machine which you purchased of us has given excellent satisfaction. In fact your sprayer is proving so satisfactory to orchard men in Nemaha County that it is being purchased almost to the exclusion of all other makes. Wishing you success, I remain, very truly yours,
C. R. WELDON,
Secretary Peru Fruit Farm

W. Cushman, President

CUSHMAN PATENT -LO SPRAYING POLE

handiest invention in spraying equipment. Illustration shows how simple it is to have either a fine close spray or throw a heavy misty spray up into the highest limbs—with just the simple pressure of one finger.

ALL SIZES
FURNISHED
WITH
TOWER
OR
WITHOUT

HERE IS WHAT PROF. THORNBER SAYS

Washington State Horticultural Department.

Pullman, Wash., Aug. 31, 1910.
Cushman Power Sprayer Co.

Dear Sir: Your letter of the 20th came to me today and in reply will say that thus far we have been more than pleased with the powersprayer that you loaned to us through Mr Seaton of Spokane. While we did not receive it as early as we desired for thorough test of our single spray work, yet we are satisfied from the pressure that we are able to secure and the manner in which the engine and pump worked, that we can do exactly what we desired from the outfit. During the spraying of our orchard we were able to maintain from 240 to 250 pounds pressure with four bordeaux nozzles and do a good thorough job not only on level ground, but on the steepest hillside orchards that there are in the country. I have used several outfits and have never found one that worked more satisfactory than this one. I hope to get a good photograph of it on our steep lands as well as on our level lands and will be more than glad to use the outfit in demonstration work for our regular classes, short course work and demonstration trains wherever possible. Very truly yours, W. S. THORNBER.

Horticulturist.

P. S.—Prof. Thornber is considered one of the greatest Horticulturists in the United States.



year—late in the season we get hundreds of letters—and telegrams—to Rush Sprayers. We have to turn many of them down—we simply cannot fill all late orders—so You Must Order Early, or you may be forced to buy an inferior make and lose your crop and lots of money. The Time to Order That Sprayer is Right Now—You need not take it now—it can be shipped in the spring. You can pay for it when you get it—But place your order now and be sure of it. We want Early Orders, so we can make them up before the rush. We want your order and we allow You a Big Handsome Discount for Orders Placed Now. You save from \$25.00 to \$40.00. Write us today and get our Big Bargain Early Order Price. Now don't put it off; fill out the coupon or write a letter today, Right Now.

L. W. Cushman

President, Cushman Power Sprayer Company

Spraying Is An Important Business Proposition

No one needs to argue in this practical age that you need to spray. All successful orchardists are spraying their fruit crop—and they are getting a bigger crop and of far superior quality, and five times as much for it.

The orchardist who plants an orchard and fails to properly spray it is just as foolish as the farmer who plants a corn crop and fails to attend it properly—neither will ever get a cent of clear profit on his investment and labor.

But all orchardists do not do it RIGHT, not that their heart is not in their purpose or work, but just because they are not properly equipped.

You cannot take a one-horse shovel and properly tend 60 or 80 acres of corn—neither can you take a barrel pump or an inefficient power spraying machine and properly spray 20, 40 or 80 acres of orchard.

You Positively CANNOT Do It, no matter how earnestly you work—you haven't the proper equipment and you are losing many times the cost of such equipment in a single season.

THE CUSHMAN POWER SPRAYER is the most efficient spraying equipment manufactured—and we offer herewith indisputable proof, just such as you would be delighted to voluntarily give after using one of them yourself.

Cushman Power Sprayer Co.

Dear Sirs: I have been thinking for some time I would write you about my spraying operations. You will remember I got my machine late in last fall and made out one spray. We were green hands, never saw a sprayer operated, and knew nothing about a gasoline engine, but got along fairly well putting out some days eight tanks.

This season I made dormant spray and two since spraying operations. We used 160 to 200 pounds pressure and sent mixture in as well as outside tree. We had minor troubles, but were easily adjusted.

I cannot better express my appreciation of the outfit than to say, if from fire or any cause I should lose this one, I would order another of your make. Its lightness, draft, adjustability and "workability" are satisfying.

Auto and gasoline men pronounce engine a dandy. You keep using good material, I wish you continued success.

Yours truly, EDWARD S. BUTT.

CUSHMAN STANDARD NO. 3 SPRAYING EQUIPMENT WITH TOWER

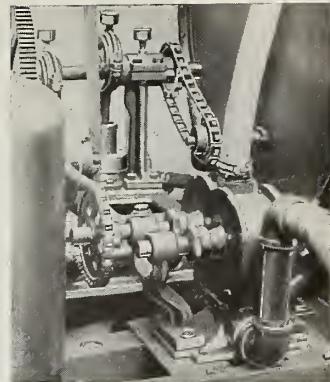
with Four Horsepower Engine, mounted on Cushman Standard Oak Beam Truck. Capacity of pumps, Ten Gals per Minute--250 pounds steady pressure guaranteed. Also furnished on Cushman All-Steel Truck.

CUSHMAN STANDARD NO. 1 SPRAYING EQUIPMENT

with 3-Horsepower Engine mounted on Cushman All Steel Truck. Capacity of pumps six gallons per minute 250 pounds steady pressure GUARANTEED. Also furnished on Cushman Standard Oak Beam Truck.



GOLD MEDAL
AWARDED US BY
NATIONAL
HORTICULTURAL
CONGRESS 1909



TANK REFILLING PUMP

The Cushman Automatic Rapid Tank Refilling Pump will elevate fifty gallons of water per minute from stream, pond or shallow well—doing away with necessity and expense of building overhead tanks. Instantly thrown in or out of gear—the regular spraying engine furnishes all power required. Equipped with Cushman Improved Double Bearings.

Read what the Expert Judges Said

"Put the Gold Medal on the Cushman, it's the Best Sprayer." Notice that Cushman won FIRST on every point, except one—almost won that. They like the Cushman in every way possible, more severely and more exacting you could ever have need to—it never balked, it never faltered, it never failed in even a minor part. It's the best built sprayer—it's the easiest to spray—it's the most powerful sprayer. That's what the judges said.

Notice that these are three of the greatest horticultural authorities we in this country—men with big national reputations. They were invited by the GREAT NATIONAL APPLE CONGRESS, absolutely impartial and they tested the different sprayers thoroughly—point by point—and CUSHMAN WON in every test with one exception.

YOU WANT THE BEST—you cannot afford to buy anything but the best, orchard profits depend upon it. WE KNOW WE MAKE THE BEST SPRAYER—but leaving you as the whole judge of the matter—COULD YOU EVER IGNORE SUCH UNIMPEACHABLE PROOF? Now what the man did in this contest it will do every day in your orchard, and it will last as superior spraying too—as it did over all others in the hands of judges.

We have hundreds of letters from users all over the country saying that it all we claim for it—and we claim all that THE WORLD'S BEST SPRAYER OUGHT TO DO.

We have hundreds of letters also from inquirers, saying "one of your

others advised me to get nothing but a Cushman."

We have hundreds of letters too, from big orchardists and Agricultural

men who have used several makes and they say "The Cushman is far the best"; and when they order more, they invariably buy more Cushmans.

It is far better to get a Cushman to start with than to wish afterwards you had. You need a Cushman—we want to sell you the Cushman. Don't buy an imitation or a substitute—get the genuine Cushman and be fied.

THE WONDERFUL POWER OF CUSHMAN SPRAYERS

The heart of a Sprayer is its Power Supply. The Cushman Sprayer is different all over—far superior in every important part; solid galvanized steel tank where others are wood; stronger truck frame and wheels; flexible short turn—just half the space others require to turn in; wide tire, steel, easy-draft wheels; a duplex spraying force pump that has excited the highest praise and admiration from expert mechanical men; a tank refilling pump that is better and faster than all others—50 gallons to the minute; easy removed engine for other uses; solid steel tower—detachable; extra large pressed steel air-pressure chamber tested to 500 pounds—cast iron is very dangerous; perfect mixing device—every drop of even strength;—and hundreds of other especially superior appliances found only in the CUSHMAN.

But—no sprayer is greater than its power supply; and in this the CUSHMAN far outshines all others. It is the lightest and simplest gasoline engine ever built—a child can start it and it runs and governs itself absolutely automatically. You may have seen other engines work—you may have run other engines, but if you have never seen the CUSHMAN Sprayer Engine work, you have a real pleasant surprise awaiting you. Runs just like a clock, pulls the hardest load, and never shirks—it is the most powerful power built. It will deliver a spray as fine as mist; put it in the highest trees—not just one lead of hose, FOUR of them, if you want them. It will maintain 250 pounds pressure with four nozzles—Guaranteed to do it, and it uses less gasoline.

Two men can easily lift the engine off or on the sprayer, the engine being furnished with an extra general purpose base free of charge, running the grain binder, tanning mill, corn sheller, cream separator, washing machine etc.

The CUSHMAN Sprayer Engine is a wonderful little power-maker, developing over four

horsepower, and is one of the big points of superiority of the CUSHMAN POWER SPRAYER.

Put YOUR Orchard-Spraying Problems Up to US. Furnishing Spraying equipment to most of the largest orchards and to most of the successful horticulturists brings us into close observation of their methods of success. This enables us to consult with you intelligently and help you to succeed—this advice is free, and we will be glad to have you write us freely. But don't wait to take advantage of this Special Early-Order Bargain Offer—you must act now or you cannot get it later. WRITE TODAY.

ADDRESS ALL INQUIRIES AND CORRESPONDENCE TO

CUSHMAN POWER SPRAYER CO.

Spokane, Washington, or Main Factory, St. Joseph, Missouri.

Official Report Spraying Machine Contest National Horticultural Congress

Report of the American Society of Agricultural Engineers Held at Council Bluffs, Iowa, November 10-19, 1910



Hon. Karl R. Wundt, Judge
Horticulturist, Idaho
Expert Orchardist



Prof. F. W. Faurot, Judge
Missouri State Horticultural Dept.
Spraying Expert



Prof. L. W. Chase, Judge
Nebraska State Uni. Mech. Dept.
Mechanical Expert

Abridged Score Card "Class A" Power Sprayers

Entry No.	NAME	Capacity and General Operation	Economy of Operation	Construction	Conven. and Accessibl.	Weight	Cost	Total
	Points	225	200	225	100	150	100	1000
5	Beck	150.8	129.1	168.5	75.5	122.5	82	728.4
4	CUSHMAN	165.54	155.2	185.0	84.5	127.5	85	802.7
3	Hardie	164.5	109.4	169.5	81.5	103.0	77	704.9
2	Deming	130.3	107.6	154.5	77.0	100.0	79	649.1
1	Peerless	129.4	109.2	166.5	85.0	109.0	71	670.1

AWARDS

Cushman Power Sprayer Co. Gold Medal

Beck Sprayer Co. Silver Medal

Hardie Manufacturing Co. Bronze Medal

THIS COUPON WILL SAVE YOU \$25 TO \$40

CUT OUT THIS COUPON AND SEND TODAY

N. W. Dept. Cushman Power Sprayer Company

St. Joseph, Missouri, or Spokane, Washington

SEND ME—Complete information about your World's Best Sprayers and your Special EARLY ORDER BARGAIN PRICE, whereby I can order now, to have shipped later, and save \$25.00 to \$40.00.

I have _____ acres of bearing orchard _____

Name _____

Town _____

R. F. D. No. _____

State _____

(It is understood that this inquiry places me under no obligation to buy)



This Test
Convinced
A Great
Orchardist

Mason City, Iowa, November 19, 1910.

Mr. L. W. Cushman

Dear Sir:—Have just received a copy of the Council Bluffs paper giving a list of the awards there. Allow me to congratulate you on your success and that together with the satisfied customers I met there, makes me pleased to give you an order. Please find Chicago draft enclosed for 25 per cent as first payment on complete outfit.

Yours truly, GEO. H. PURDY.

LESLIE BUTLER, President
TRUMAN BUTLER, Vice President
C. H. VAUGHAN, Cashier

Established 1900

Butler Banking Company

HOOD RIVER, OREGON

Capital fully paid - - - - \$100,000

INTEREST PAID ON TIME DEPOSITS

We give special attention to Good Farm Loans

If you have money to loan we will find you good real estate security, or if you want to borrow we can place your application in good hands, and we make no charge for this service.

THE OLDEST BANK IN HOOD RIVER VALLEY

New Residents

We are always pleased to extend courteous assistance to new residents of Hood River and the Hood River Valley by advising them regarding any local conditions within our knowledge, and we afford every convenience for the transaction of their financial matters. New accounts are respectfully and cordially invited, and we guarantee satisfaction. Savings department in connection.

Hood River Banking and Trust Company

HOOD RIVER, OREGON

LADD & TILTON BANK

Established 1859

Oldest bank on the Pacific Coast

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Capital fully paid - - - - - \$1,000,000
Surplus and undivided profits - - - - - 800,000

Officers:

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INTEREST PAID ON TIME DEPOSITS AND SAVINGS ACCOUNTS

Accounts of banks, firms, corporations and individuals solicited. Travelers' checks for sale, and drafts issued available in all countries of Europe.

ARSENATE OF LEAD FOR SPRAYING

How to prevent what is estimated by experts as more than a quarter of a billion dollars' annual damage to the crops of this country by insects and germs is a problem which is engaging, as never before, the attention of horticulturists, fruit growers and farmers. It is accepted that the best method, so far discovered, is that of destroying the pests by means of judicious spraying with arsenate of lead. This reliable and economical insecticide is now employed with most satisfactory results by leading entomologists and growers, and its use is steadily on the increase throughout the country. Arsenate of lead is particularly fatal to leaf destroying insects and can be freely used without risk of rusting or scorching the most tender foliage. Care must be taken, however, to see that the poison is of full strength and properly combined. Such an article is that the P-W-R brand, guaranteed under the insecticide act of 1910 by the manufacturers, Powers-Weightman-Rosengarten Company, Philadelphia, New York, St. Louis. It is supplied in both paste and powder form, at lowest ruling prices, by first class wholesale drug houses, drug stores and seed houses throughout the United States.*

REO MOTOR CARS

R. M. Owen & Company have just issued their 1912 announcement number of the Reo Echo, and it easily ranks among the largest, brightest and strongest house organs published in the world. A. Lincoln Crayon, the veteran motorist and automobile writer, tells in his clear, realistic, amusing and intensely human way, in story and bright halftones, a score or more interesting things that happened on his motor trip from New York to

Jacksonville in the 1911 Glidden tour. Many other popular writers are included among its contributors. This handsome 48-page brochure sparkles with wit, humor, love of nature and country from cover to cover. The rod, gun and chase each come in for a neat share of attention. The farmer, business and professional man is equally represented, and will find much of help and interest to him. A limited number of complimentary copies will be distributed at the New York Madison Square Garden Auto Show, June 20, 1912. A copy will also be mailed free to anyone on request to R. M. Owen & Company, 1759 Broadway, New York, so long as the limited supply lasts.

YOU CAN'T GET AWAY FROM IT

We mean that big red tomato on the front cover page of the Maule Seed Book for 1912. It may not be esthetic, probably is not, but you're sure to see it, and you naturally open the book to see what follows. However, on the back cover page is a beautiful colored plate of the new Crego aster, in all the wonderful coloring of this new candidate for the favor of flower lovers; so the esthetic person can admire the back cover and the matter-of-fact gardener look at the front cover and both be satisfied. Between the front and back covers are 176 large pages descriptive of the seeds and plants which have made the name of Maule a household word among farmers, gardeners and flower growers from the Atlantic to the Pacific and the regions beyond. It may be noted in passing that some of the most valuable varieties of grains and vegetables, as well as many rare and beautiful representatives of the flower kingdom owe their introduction to the enterprise

and genius of Mr. Maule. He stands in the very front rank of seedsmen for the first class quality of his seeds and plants, promptness in filling orders and courtesy in dealing with his customers. His seed book for 1912 is one of the catalogues which every farmer and gardener should have. His motto of "Your money back if not satisfied" has been his policy for years, and is only made possible by the uniformly good quality of the Maule seeds.

The Gasoline Caterpillar Traction Engine manufactured by the Holt Manufacturing Company of Stockton, California, is the only engine yet devised that will successfully and economically plow the soil under any and all conditions. The soil is never too wet nor too dry, too hard nor too soft, too packed nor too loose for the Caterpillar to work to good advantage. Its ability to work under conditions of wet soil, mud and wet sod was brought out in a marked manner at the exhibitions and demonstrations of the Caterpillar held at Helena, Montana; Spokane, Washington, and Salem (Oregon) Fair during the early part of the fall. The Holt Manufacturing Company has been too busy with its attempt to keep up with the orders received in the regular course of its business to devote any time or attention to pulling off freak stunts of pulling fifty or more plows with three or more engines hitched abreast. These exhibitions are of interest to show what can be done under very favorable circumstances, but are of no practical value in the every day work of cultivating soil. The Caterpillar is ready for work whenever the work is ready. It will plow deeper and plow cheaper than any other power yet devised. The Holt Manufacturing Company has placed in the agricultural farm machinery laboratory at the Oregon Agricultural College, Corvallis, Oregon, one of its standard sixty horse-power Caterpillar Gasoline Enginess. This tractor is getting much favorable attention from the regular students as well as those orchardists and farmers taking the shorter winter course.

The Motsinger Device Manufacturing Company, of Lafayette, Indiana, in a recent letter state that the new Motsinger (15 magnet) D. C. magneto has been adopted and specified as the standard equipment in a contract just placed by the Lininger Implement Company of Omaha, Nebraska, with the Field Brundage Company for 2,000 Field engines to be delivered during the year 1912.*

CAPITAL STOCK \$100,000 SURPLUS \$22,000

First National Bank

Hood River, Oregon

F. S. STANLEY, President
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E. O. BLANCHARD, Cashier
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ESPECIAL ATTENTION AND CARE
GIVEN TO BUSINESS DEALS
FOR NON-RESIDENT CUSTOMERS

Thorough and Conservative
Assets over \$500,000

Savings Bank in connection

A New Apple District—The Goose Lake Valley

By L. E. Seager, Davis Creek, California

THE winter Banana apple shown on the cover page was grown at Davis Creek, Modoc County, California, in the Goose Lake Valley. Davis Creek country is peculiarly favored by nature as to soil, altitude, climate, sunshine and water—a combination which will make it famous in the production of the perfect apple. The attention of the outside world was first called to the Davis Creek locality in the fall of 1910 at the apple show at Watsonville, California. An exhibit of eight boxes of eight varieties from one orchard was sent as a plate exhibit, which carried off six prizes, four first and two seconds. The apples created such an impression that fruit buyers, particularly McDonald & Sons of Watsonville, made an effort to obtain the 1911 crop. But there being no commercial orchards yet in bearing it was impossible to supply the carload lots demanded by the buyers and supply the local demands too. Commercial orchards are now being planted, the Davis Creek Orchards Company being the pioneers in this work. From 20,000 to 25,000 trees will be planted this spring, with the Winter Banana variety predominating. The only shipment ever made from Davis Creek was in the fall of 1910, when 700 boxes of Winter Bananas were gathered from a little over an acre of trees, after supplying part of the local demand, and sold f.o.b. Alturas at \$1.50 per box.

Alturas is twenty-one miles south of Davis Creek, and was at that time the nearest railroad point. Transportation is now there, the N. C. O. Railway having completed its line into Davis Creek last August. It is rumored that this railroad is controlled by the Hill interests, and probably will be the connecting link between the Hills line building down the DesChutes, in Oregon, and San Francisco.

The valley has an annual rainfall of about twenty inches, a splendid growing season and very little irrigation is necessary. An apple crop failure has never been known here; and the firepot is unknown. Trees were never known to winter kill. The valley will soon be known as the home of the famous Winter Banana apple, and that will make the district celebrated, and the profits to the orchardist will attract his attention. Winter Banana trees set out for four years come to bearing. In other districts the Winter Banana has been grown, but here they grow to perfection. Other varieties do well, too; for instance, the Yellow Newtown Pippin, Blue Pearmain, Black Twig, Gano, Northern Spy, Spitzenberg, Bellflower and many others do equally as well. This valley is more than a one-crop section. It has for years grown all the grains, hay, vegetables and fruits and berries that do well in the temperate zone. Pears, cherries and peaches are

Kill the Scale

That Kills the Fruit

With the most concentrated solution of them all.

LILLY'S

LIME ^A _N SULPHUR

Pure, Strong and Free From Sediment

Every barrel or can TESTED and the strength stamped on the label so that the user knows just what to use.



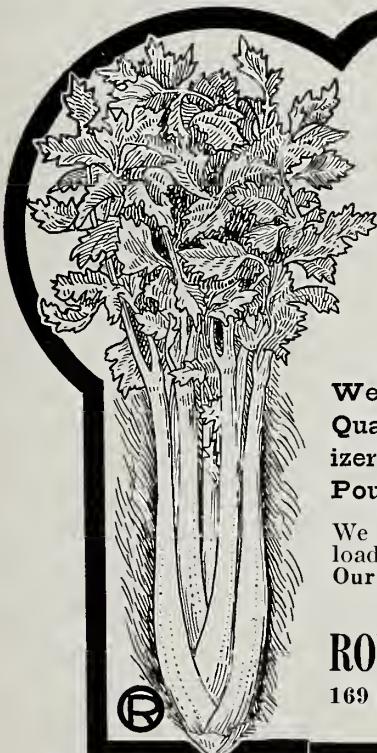
Send for copy of Lilly's Spray Book and Price List, mailed free. It is a valuable book to all interested in fruit raising.

The Chas. H. Lilly Co., Seattle

Buy and Try

White River Flour

Makes
Whiter, Lighter
Bread



We Want You to Know

That we hold the same position among Seed and Tree Dealers as "Better Fruit" does among publications of its kind. You would not take "Better Fruit" if you didn't want THE BEST. Such being the case, let's get acquainted.

We want your orders for our "Highest Quality" Seeds, Plants and Trees, Fertilizers, Sprays, Pumps, etc. Incubators, Poultry and Garden Supplies

We are Importers, Growers and Buyers in carload lots. No order is too large or too small. Our new 1912 Annual tells all. Ask for Book No. 27, the latest.

ROUTLEDGE SEED & FLORAL CO.

169 Second Street

PORLAND, OREGON

SEEDS

THE KIND YOU CAN'T KEEP IN THE GROUND

They grow, and are true to name
Write for prices on your wants

188 Front Street

J. J. BUTZER Portland, Oregon
Poultry Supplies, Spray, Spray Materials, Fruit Trees, Etc.

W. F. LARAWAY

DOCTOR OF OPHTHALMOLOGY

EYES TESTED LENSES GROUNDED



Over 30 Years' Experience

Telescopes, Field Glasses
Magnifiers to examine scale

Hood River
Oregon

and

Glenwood
Iowa

almost as profitable as apples. Apples have been grown by the older settlers for years. In all these years they have not been troubled with disease or pests of any kind in the trees.

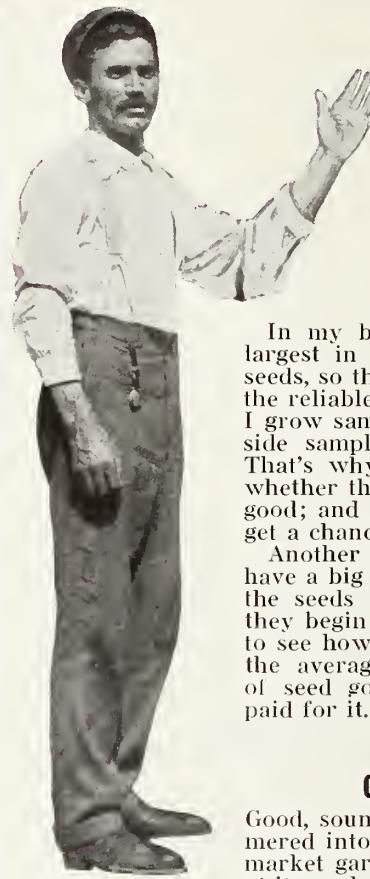
The district is peculiarly favored by nature as an ideal living place. Goose Lake is a beautiful body of water about thirty-five miles long and from six to fifteen miles in width. It is truly a beautiful body of water, so clear that the gravel bottom, surrounded by a broad gradual beach, can be seen even where the water is twenty feet deep. In its depths are millions of fine fish, and the bathing is superb. On the mountain sides virgin timber, protected by government forest reserve regulations, skirts the shore on the west, while low, rolling, rich agricultural and horticultural lands lie on the south and east. The summer climate is unequalled anywhere. The rivers and mountain streams abound in trout; the swamps, pools and lakes with wild fowl in season. The uplands abound with sage hens and rabbits. Grouse and quail are also to be found. Bear, cougar and wildcat in the mountains. The fall and spring flight of ducks and geese fills all the likely spots with these water fowl, and the bag limit fixed by law is easily obtained. Persons who have traveled the Pacific Coast say that Goose Lake is as pretty a lake as they have seen in the whole coast country. More beautiful than Lake Tahoe; it has many attractions unequaled by Tahoe. It is larger and permits of bathing. Its surroundings are more majestic and rugged.

[“Better Fruit” has been favored with some of the Winter Banana apples from Davis Creek, and we must say that we have never seen a better all around Winter Banana specimen from any orchard district. The apple shown on the cover page does not do the apple justice, but comes as near to the true colors as human hand can make it.]

THE OREGON AGRICULTURAL EXPERIMENT LEAGUE

The Oregon Agricultural Experiment League takes this method of calling attention to its work and to ask for your co-operation. The aim of the league, as stated in its constitution, is “to further every branch of agricultural interest in the State of Oregon by means of experiments, tests and the collection of agricultural data in co-operation with the Oregon Experiment Station and the Oregon Agricultural Extension Department, and to report and disseminate the results of the experiments and tests and the knowledge obtained therefrom. Every alert man is constantly meeting problems which he solves in due course, but of which no records are available. Thus it may be necessary for scores of men to attack the same problem with varying results until, usually by accident, some permanent record is made. By having a clearing house where such records are collected and published a great step will be taken to do away with useless duplication. The Oregon Agricultural Experiment League was established for this purpose. If a single investigator at an experiment station can gain invaluable knowledge from one agricultural experiment, imagine the accuracy and value of the results, to say nothing of the saving in time, which may be obtained from carrying on that same experiment on a hundred farms scattered all over the state. A similar league, the Ontario Agricultural Experiment Union of Canada, has for twenty-five years been assisting its members in solving their agricultural problems, and has increased the production of farm crops from eleven to twenty-five per cent in twelve years. It has over 6,000 mem-

ORDER YOUR SEEDS FROM FIELD—CUT OUT THE RISK



You ought to buy seeds the same way you would buy anything else—with full assurance beforehand that, with proper care, they will do just what you expect and pay for. You may not be used to doing this, but you can do it if you buy right the first time—order from a seedsman whom you can trust, whose success in business is built on the success of his customers. That's my record—the only one I want to be judged by.

MY SEED-TRIAL GROUNDS ARE MY “CONSCIENCE”

In my big trial grounds here at Shenandoah—the largest in the West—I spend hours and days testing seeds, so that I may always be sure that you are getting the reliable seeds I want you to have. All summer long I grow samples of the seeds I sell, in little plots alongside samples obtained from other leading seedsman. That's why I can tell you how my seeds grow, and whether they're better than the other fellow's or not so good; and if mine show up inferior you bet you never get a chance to buy them.

Another important thing is my germination tests. I have a big special incubator where I put samples of all the seeds I offer, keeping them moist and warm till they begin to sprout. Then I count the sprouted seeds to see how many out of each hundred have grown. If the average is high, all right; if not the whole lot of seed goes to the dump, regardless of the price I paid for it.

MY NEW CATALOG CONTAINS GARDEN AND FARM HINTS GALORE

Good, sound, hard-shelled facts—the kind you get hammered into you by experience. I've been a farmer and market gardener ever since I was a little tad—I'm still at it—and what I've learned in these years of hard work I've put down here to help you.

My 1912 Catalog is mighty good looking, but it reads better still—and the seeds it describes are best of all. Honestly, you oughtn't to try to make garden or turn a furrow till you've read it. Address a postal to me, give it to the mail man today, and see how quick I get that book into your hands.

HENRY FIELD, President
Private Desk No. 5
HENRY FIELD SEED COMPANY
SHENANDOAH, IOWA

bers and has performed 60,000 experiments in agronomy alone. The league proposes to ask its members to carry on simple experiments on their own land under the direction of the experts of the agricultural college. It makes no difference whether you are a general farmer or a specialist in dairying, animal husbandry, horticulture or any branch of agriculture we need your assistance, and we have experiments outlined for your particular line of work. We shall send complete instructions for carrying them on, and the work need take little of your time and a very small portion of your land. The expenses of the Oregon league, which consist mainly of the cost of printing, postage and materials, are borne chiefly by the Oregon Agricultural College, and the admission fee is but one dollar with annual dues of one dollar, payable February 1, beginning in 1912. The league will stimulate fuller and better agricultural knowledge, the lightening of farm burdens, the solution of farm problems and a greater Oregon. You need its assistance and the league needs and invites your co-operation. Further information will gladly be furnished by the secretary, and applications for membership should be addressed to him and accompanied by the admission fee of one dollar. Stanton

Griffis, secretary, room 222 Agricultural Building, Oregon Agricultural College, Corvallis, Oregon.

THE RIGHT WAY TO BUY A SPRAYER

It has always been our belief that any firm offering to send its goods on absolutely free trial must have something especially genuine to sell. It is, therefore, quite a pleasure and a duty also to call your attention to the announcement of the H. L. Hurst Manufacturing Co. of Canton, Ohio, for not only does this firm offer to send any of its sprayers on free trial, but it is also willing to send any machine without the payment of a deposit, and the buyer has the option to pay for it next November, which will give him an opportunity to pay for the sprayer out of the extra profits which it will earn for him. This is one of the most generous offers that has ever come under our notice and one which our readers cannot profitably overlook. It will pay you well to write the Hurst people at the above address and get their big free catalog, condensed spraying guide showing all kinds of sprayers. If you have a garden or a thousand acre orchard, they have a sprayer for you—all guaranteed for five years.

MORSE'S GARDEN GUIDE for 1912

Our Guide this year is the fullest and most interesting we have ever issued

IN THE VEGETABLE LINE

it calls particular attention to some sterling novelties that every planter should try, including a new sweet corn, three varieties of culinary peas and a new wax bean.

IN FLOWER SEEDS

a new hybrid mixture of the Golden African Daisy, a new Snapdragon, and a new mixture of Giant Verbenas.

IN PLANTS

some wonderful new roses, Dahlias and Begonias are particularly described. This valuable book will be sent free for the asking.

C. C. Morse & Co.

128 Market Street
SAN FRANCISCO

the tree forces out three or four laterals of about equal strength, these can be headed back and the tree treated like an open center, very low headed tree, and by inarching and intertwining all branches that can grow well together such crotches can be made much stronger than otherwise. Often it will be found better to remove all but one of these new sprouts, and prune it as if it were a new tree. Trees three years old or more, having fairly large bodies, should have another treatment, either rebudding or regrafting. In this way one would be fairly sure of losing few trees. I would cut the tree back to about one foot from the ground and insert a couple of scions, either by cleft graft or bark graft. These scions would force out a fine growth, which will need close watching the coming year and should be pruned, either by June or early July, heading back the rank terminals so as to force out desirable laterals and keep the tree low headed. In cases of sun scald and sour sap, or of injury by squirrels or rabbits where



Once Grown Always Grown
Maule's Seeds
Fruitmen in all sections
pronounce them the best ever

My new Seed Catalogue is a wonder. Contains everything in seeds, bulbs, small fruits and plants worth growing. 600 illustrations; 176 pages. Anyone sending his name on a postal card can have it for the asking. Send for it today. Address

WM. HENRY MAULE
1707-09-11 Filbert St., Philadelphia, Pa.

Send 5 cents (stamps) mention this paper, I will enclose in the catalogue a packet of the above GIANT pansy.

Pruning Trees Hurt by Storm

HOW to treat young trees badly injured by silver thaw and other weather conditions is a point of inquiry with many people in various sections who are writing Professor C. I. Lewis of the horticultural division of the Oregon Agricultural College. In some cases practically every branch has been stripped from the tree, while in others the damage has been slight.

"The first impulse of the orchardist is to rip the trees out," says Professor Lewis. "This would probably be a mistake, since, with all trees except one-year-olds, it is found that there is a very good root system, and that if the trees are cut back properly this root system can be made to force out a strong, vigorous top. Often trees that have been injured by freezing in winter, or by sour sap and sunscald in spring, or by rabbits and squirrels may be cut back in such a way as to force out a new top. If the snow or ice has merely broken off the branches the

broken branches should be cut with a sharp instrument, and where there are two or three buds left on a main branch new branches can generally be forced out and a new body be built on the tree. If the branches are all stripped from the trees there are several things that can be done. The tree may be simply cut off below the badly stripped place—in some trees this would be about sixteen inches above ground. For example, I have found that occasionally two or three-year-olds so treated simply feathered out, the buds, instead of forcing out good leading branches, developed clusters of leaves. Occasionally, on the other hand, they force out their strong, new laterals. Another way is to cut back severely, from three to six inches from the ground. Cutting back in this way will often force out strong laterals. The next year these laterals can be pruned like new trees, and you are then apt to have the benefit of several things. If

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140 VARIETIES ANY QUANTITY
Plenty of stock in our 40,000 pounds
Growing Plants as season requires
All makes high grade
Pruning Tools
Garden Tools
Hose and Spray Nozzles
International Stock and
Poultry Food
International Remedies
Incubators and Brooders
Everything for Building
Everything for Furnishing
Stewart Hardware & Furniture Co.
Hood River, Oregon
22,000 feet floor space

the trees are girdled, if the tree is cut off below the point of injury, good strong shoots are sent out. The root system of the tree is uninjured and will furnish an enormous amount of sap, and the buds that are forced out will probably be strong. Only in rare cases would I take the trees out roots and all. Occasionally where the tops seem badly injured from uncongenial spring conditions, the sprouts will be forced and yet the top will remain alive. If the tops seem to be vigorous, I would cut off the sprouts at the ground, but if there is a question as to the vigor of the top and no question at all that the sprouts are strong and vigorous, I would remove the old top and train the sprout into a new tree. As a rule the sprouts come out above the graft, and in such cases there will be no need of grafting. In a few cases, however, the sprouts will come out below, and it will be necessary to rebud or regraft the tree to a desirable variety."

ELEMENTS OF PLANT FOOD

Professor R. W. Thatcher, director of and chief chemist at the agricultural experiment station at the Washington State College, emphasizes the necessity of nitrogen, potassium and phosphorus being present in orchard land, and calls attention to the absolute essential of sufficient water to carry these plant foods into the crop. He says: "The three critical elements of plant food are nitrogen, potassium and phosphorus. A sufficient supply of each of these, in available form, with enough moisture in the soil to carry this plant food into the crop and cause an active sap flow are the chief essential factors of fertility. Potassium and phosphorus are mineral elements derived from rocks. Nitrogen is an organic (vegetable or animal) element derived originally from the atmosphere and presence in the soil is a result of the decay of vegetable (or animal) material. Hence soils in a dry country, where there has been comparatively little natural vegetation to fall into and decay in the soil, are nearly always rich in the mineral elements of plant food, but poor in nitrogen. Phosphorus is used by plants chiefly for the production of seeds and potassium for the manufacture of starch and sugar (fruits, tubers, etc.), while nitrogen is used almost exclusively for the development of the green growing parts of the plant (foliage, new stems, etc.). Nitrogen is, therefore, the element needed most largely in the

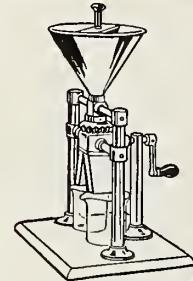
young growing period of plants, trees, etc., Hence on new sagebrush lands which are to be brought under irrigation and planted to orchards, a sufficient supply of available nitrogen is likely to be the chief necessity for rapid growth, provided that plenty of water is available on such lands, where the natural supply of nitrogen is small, the rapid growth of trees can nearly always be considerably hastened by an application of available nitrogen as fertilizer. There are three possible sources for nitrogen for fertilizer use in this state—farm manure, dried blood or other slaughter house waste products and nitrate of soda. The first two must decay before their nitrogen is liberated in available form. Nitrate of soda carries its nitrogen in a form immediately available to plants. Manure or dried blood, etc., should, therefore, be applied to the soil in advance of the time that the crop is to need their nitrogen, generally when the land is being prepared for the crop; while nitrate of soda should be applied at the time when the plants need it. This is when they are making their most rapid wood and foliage growth. A one-year-old apple tree will use, generally profitably, the nitrogen contained in four to six ounces of nitrate; a two-year-old tree that is making vigorous growth will take six to eight ounces of nitrate, and older trees in proportion. Soils naturally very deficient in nitrogen should receive heavier applications than those richer in decaying vegetation and nitrogen. On most young orchards planted on sagebrush lands, where plenty of irrigation water is available for heavy growths of trees, available nitrogen will undoubtedly aid in securing such growths. The use of available nitrogen fertilizers under such conditions seems to me to be a desirable practice. Whether nitrate of soda or other nitrogen-carrying materials, in combination with potassium fertilizers, can be profitably used in bearing orchards can only be determined by experiments. This practice is common in older states, and on soils similar to those of our irrigated lands, and experiments to determine whether this would be a profitable practice here ought to be carried out."

A NEW POULTRY BOOK

One of the brightest and most practical poultry books ever produced on the Pacific Coast has just reached our office from the press of The Chas. H. Lilly Co. This book is edited by Mr. Ralph B. Randall, one of the leading poultry experts of America, and previously of England. Some of the leading articles to be found among its voluminous pages are the "Care of Chicks," "The Development of Young Stock," "Breeds," "Feeding of Poultry," "Feeding for Eggs," "Fattening for Market," "Poultry Houses," "Poultry Ills," "Artificial Incubation," etc. The cover page, which is most attractive, is a drawing from the pen of that clever poultry artist, Mr. Franklane H. Sewell. The Chas. H. Lilly Co. of Seattle are sending this out free to all who will write and ask them for a copy.

Testing the Seeds

That's what we are doing and by using every method and instrument



This is the Seed Mixer approved by the U. S. Government and used by us.

known to modern science and skill we eliminate chance and help make your harvest a bumper one.

Every shipment of seeds that arrives at our plant is tested by an agronomist and expert seed tester before being placed in Lilly packages or sacks.

LILLY'S ←
SEEDS →

are positively tested seeds—no guesswork, no naked eye inspection, but a scientific test is made for germination, purity and pedigree.

Let us send you a copy of our pamphlet on "Seed Testing"—of interest to all farmers. Write the Chas. H. Lilly Co., Seattle, Wash.

for this pamphlet and



Seed Annual Mailed Free

This is the Germinator approved by the U. S. Government and used by us.

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FANCY BOX APPLES

SEEDS

For GARDEN, FLOWER AND FIELD. Our 1912 Complete New Seed Annual Now Ready

A reliable reference and Buyers' Guide for Northwestern Growers

Fully illustrates and presents newest and most desirable varieties for market or home gardens. Specially adapted to Northwestern requirements.

Latest and best equipments for the Farmer, Orchardist, Poultryman and Beekeeper

Ask for 1912 Catalog No. 200

Our seed laboratory is equipped in the manner approved by the U. S. Dept. of Agriculture and is in charge of an expert seed analyst. No effort or expense is spared to safeguard our customers and insure the quality and purity of "DIAMOND QUALITY" SEEDS.

MASTODON PANSY PLANTS

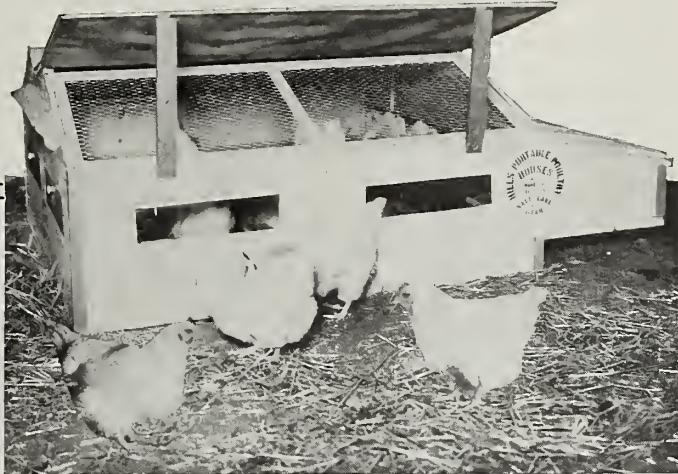
For size, beauty of form and coloring, firmness of texture and earliness, our

MASTODON PANSIES have no equal. In baskets, **60c to \$1** per dozen; Seeds, **25c** per packet.

Our Diamond Trade Mark is a guarantee of Quality, Satisfaction and Full Value, backed by 25 years of success right here on the Pacific Coast.

Write a card today for 1912 Seed Annual.

PORTLAND SEED CO. PORTLAND OREGON



HILLS' PORTABLE POULTRY HOUSES WITH REGISTERING NESTS COMBINE BETTER POULTRY WITH BETTER FRUIT

ORCHARDISTS everywhere are awake to the fact that **POULTRY RAISING** conducted under the modern **COLONY SYSTEM** is an invaluable adjunct to their business. It can be carried on in connection with fruit-growing without extra outlay for land, and the bulk of the labor comes at slack times in the orchard work. Hills' Portable Poultry Houses are the most practical for orchard use, as they are low enough to be easily moved without injury to the trees. They afford the ideal conditions for **POULTRY HEALTH** at all seasons of the year in all climates. The Hills' Patent Registering Nests easily and accurately weed out the unprofitable layers and thus assure **MAXIMUM POULTRY PROFITS**. For Safety, Convenience and Money-making and Money-saving features no other houses approach the **HILLS' PORTABLE POULTRY HOUSES**.

SPECIAL 30 DAY OFFER

I want to place a copy of the blue-print Plans and Specifications for **HILLS' PORTABLE POULTRY HOUSES** and **BROODER HOUSES** in the hands of every progressive orchardist this season. These are not mere picture descriptions, but large, complete plans, giving every measurement in detail, and accompanied by an assembling chart which makes it easy for any carpenter or handy man to build houses identical with the \$24.50 manufactured houses, including Registering Nests, Sanitary Feeders and all latest improvements. These plans are sold regularly for \$10.00, but for the next 30 days I will send the set postpaid, together with right to build for private use, for

\$2.50

In response to numerous requests I have prepared with great care a chart giving a complete outline of my system of feeding. This system has given uniform success both on my own poultry farm and in the hands of hundreds of my customers. The chart provides complete rations for baby chicks, growing chickens, fattening, breeding and laying stock, and will be found worth many times its cost every week to anyone who raises chickens. All the feeds given are readily available and require no special machinery or labor to prepare. I will send you one of these charts postpaid upon receipt of 50 cents in stamps, or I will include one with above offer for

\$2.75

LEWIS A. HILLS, HILLS' POULTRY FARM

(Formerly Chantecleer Poultry Farm)

■ 310 East 15th South Street, Murray Station ■

SALT LAKE CITY, UTAH

FREE BENEFITS FOR THE FARMER IN MODERN BUSINESS

Modern business organization and the farmer—where is the connection? A quick answer without any thought on the subject would almost invariably be: There is no real connection between them. That is, in the mind of the average crop grower who lives away from the busy town and city centers of commerce, there seems to be but slight reason for declaring that his life is to any great extent affected by the high degree of development in business organizations in the city. But consider one feature alone of the modern, progressive business house which every farmer and gardener can turn to his immense advantage. Think of the large sums of money that are spent each year by the best and most energetic concerns on the item of their annual commercial catalogues.

The modern commercial catalogue has attained a genuine value for the farmer. The catalogue which is compiled in accordance with the latest business principles contains a fund of useful and practical information of the utmost value. These catalogues are, of course, sent free upon request. Sent thus to all parts of the country, they have become important factors in distributing the latest scientific information on all manner of subjects. No better example of the value of such

a free commercial catalogue could be had than that issued by S. L. Allen & Co., in Philadelphia, makers of the famous Planet Junior farm and garden tools.

The Allen firm very accurately terms its new catalogue "The Planet Junior Farm and Garden Handbook for 1912." That is precisely what it is. In keeping with the advanced methods of the best business houses, the Allen company have made their "catalogue" not merely a list of implements, pictures and prices, but a genuine handbook for reference upon proper methods and proper tools for ground preparation of all kinds and in all parts of the world. Besides the general interest and profit which up-to-date growers will find in examining the Planet Junior line of 55 farm and garden tools (latest improved and carrying the newest labor and time saving inventions) there will also be found in this free book valuable hints and suggestions for better results, bigger crops and lighter work.

No matter whether you are an orchardist or a market gardener, or a cotton grower, or a beet grower, or a farmer raising a great diversity of crops, you will find in this 64-page illustrated handbook a perfect mine of useful information on how to make your work and your crops count most and your earnings mount highest. So there is a definite connection between modern business organization

and the farmer, no matter how remotely he may be situated. A postal from you will bring in the return mail the Planet Junior Handbook for 1912, which will enable you to see for yourself how readily you can turn such a catalogue to your own profit. Address S. L. Allen & Co., Box 1106U, Philadelphia.*

R. M. KELLOGG COMPANY
Breeders of Thoroughbred Pedigree
Strawberry Plants.

Three Rivers, Michigan, January 26, 1912.

Editor Better Fruit:

The January issue is here, and it seems to me as if each issue of your paper was more beautiful than the preceding one. I was very glad to have your letter of some days ago and to know that the words of congratulation I sent you were encouraging and cheery. I said nothing which was not deserved by you, and now your January number only adds to my further appreciation of the extraordinary publication you are putting out every month. With best wishes for your continued prosperity and awaiting your further instructions, I remain very truly yours, W. H. Burke.

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Authentic and valuable information about breeding, hatching, raising, feeding and housing poultry is contained in the latest edition of Lilly's Poultry Book—just printed. Send for copy, free.

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The high-grade hatcher now down to bedrock price. Well built of best material, has triple walls, top and bottom, Al lumber, covered with asbestos and galvanized iron, hot water copper tank, self regulator, safety lamp, thermometer, high nursery, high metal legs, etc. Direct from factory to user under money back guarantee. None better at any price. It is safe, simple, durable, easy to heat. Saves $\frac{1}{2}$ oil. Set up complete. The result of 17 years' with incubators and raising poultry. Write for our big book and catalog.

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An Honest Incubator At an Honest Price

Hot Water, Copper Tank, Self Regulating, Chick Nursery. Safety lamp, tested thermometer, best construction of three walls all over with asbestos between each wall. So simple that anybody can make big hatches. Get our catalogue and low delivered price.

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Guaranteed to meet the requirements of the various State Agricultural Societies.

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GUIDES SHOW VISITORS THROUGH BIG GOODYEAR FACTORY

One of the innovations introduced in the automobile tire industry this year is that of the opening of a special department in the plant of the Goodyear Tire & Rubber Co. at Akron, Ohio, for the purpose of showing visitors through the big plant in such a way that when they have completed the tour they have a very good understanding of the process of tire construction. During the past few years the number of visitors to the Goodyear plant has increased so rapidly that it was found impossible for the officers of the company and their assistants to show each visitor through the plant as they would like to. To eliminate this and at the same time insure their guests the best of attention and an intelligent explanation of each operation in the factory a canvass of the employes was made for a man who had a thorough knowledge of the details of tire building and factory methods and at the same time possessed the qualifications to present this information in an interesting and instructive manner. This department has now been in operation several months and has proven a great success. The dealers in No-Rim-Cut Tires from all parts of the United States, who are constantly visiting the Goodyear factory, have, by the interest shown in products, made it necessary to enlarge this department considerably since its inception. The story of how a biscuit of crude rubber is washed, sheeted, dried, expertly compounded, calendered, worked into an automobile tire on the Goodyear patented tire building machine, cured and packed for shipment is one in which owners of motor cars and dealers take great interest.

The J. I. Case Threshing Machine Company furnished a fitting climax to the most successful year in the annals of agriculture by announcing that it had increased its capital stock from \$5,000,000 to \$40,000,000, and would add several new lines to its already big output of farm machinery and engines. The details of the expansion policy and what it will include has been held in reserve by the officials of the Case company, but it is generally known that a new gas tractor will be put on the market in 1912. The Case gas engine experts have been at work on the new product for some time, experimenting and testing, and now it is claimed the new tractor is

ready for marketing. Several additions will be made to the big plant of the Case company in addition to those already in the course of building. The new gas tractor home will be one of the most complete in existence and will be completed in 1912. Banking interests friendly to the Case company have encouraged the expansion policy and the floating of the first \$20,000,000 of Case common and preferred stock excited little more than passing interest. The assets of the company were conceded to be many times in excess of its old capitalization, to say nothing of the world-wide influence of the Case name and the far-reaching power of its great army of 10,000 representatives in the field and its 65 branch houses all over the world. The history of the J. I. Case Threshing Machine Company reads like a fairy tale. Just seventy years ago the founder of the great plant, which now covers upward of two hundred acres, came to Racine, Wisconsin, from New York state. And while he has long since passed away, his name still remains standard trade mark in the threshing machinery world. The beginning of the great Case plant was infinitesimal compared to its size today. It covered less than an ordinary city lot, but improvements that the brain of J. I. Case had imbedded in his own threshing machine made it far superior to any other in use, and in the spring of 1843 the Case com-

pany began to expand and never stopped until it now is the largest institution in the world of its kind. In 1897 the last reorganization of the company took place, but the name of the institution remained the same, the J. I. Case Threshing Machine Company, incorporated, and the capitalization was raised to \$2,000,000. F. K. Bull was elected president and Frederick Robinson vice-president, while R. T. Robinson was chosen secretary and Charles L. McIntosh treasurer. Later the capitalization was raised to \$5,000,000 and Charles L. McIntosh, who died, was succeeded by F. Lee Norton, the present incumbent. If an attempt were made to go into detail of the Case plant at Racine it would require a volume to complete its description, and with the expansion policy carried out that has been determined upon the capacity of the institution will be trebled. The latest building completed is in connection with the automobile factory, which is three stories high and has close to 100,000 square feet of floor space. The plans for the coming year call for the construction of 3,000 automobiles, and these will only supply the demand of the branch houses in the different parts of the world. The rumors that have been floating around of a threshing machine trust are further dispelled by the action of the Case company, and means more competition than ever in farm machinery circles. *

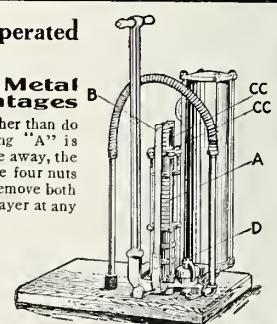
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The Three Snout Beetles That Attack Apples

Continued from page 23

The beetles make two kinds of wounds in the fruit. One of these is made by the female to receive the egg and the other is made by both sexes in feeding. Both forms of wounds are in the shape of minute punctures through the skin, which extend to a depth of about .04 of an inch into the flesh of the apple. On the surface of the fruit the average sized opening is slightly less than .01 of an inch across, but beneath the skin it is enlarged considerably. Externally the egg punctures may be distinguished from the others by the small mass of glue-like excrement with which the opening through the skin is sealed. The feeding punctures are left open. The wounds are so small that in making a careful examination the aid of a magnifying lens is necessary. The fruit may be attacked at any point on the surface, but the punctures are usually found most numerous about the calyx and stem. So far as could be determined nearly all the wounds that are made in sound fruit occur when the apples are quite small. The feeding punctures, in cases where decay does not set in, usually heal over so that they show only as minute scars in the ripe fruit. The same is true of the egg punctures where the eggs fail to hatch or where the larvae die soon after beginning to feed, as is often the case. The wounds made by the weevils are sometimes found and enlarged by plum curculios, and possibly by other insects that feed on apples. The wounds also form centers for the spread of decay. The larvae that hatch from the eggs feed on the fruit, forming tortuous tunnels through the flesh, or, more often, make large and irregularly shaped feeding chambers about the core. The excavations are filled with dark colored, granular excrement, scarcely any of which is cast to the surface of the fruit. The larvae are not able to reach full growth within apples that hang to the branch and continue to grow vigorously. They will live for a few days in such fruit, feeding about the chamber in which they hatched, but die after a brief effort to subsist on the juicy growing fruit. In apples that cease to grow, whether they fall to the ground or remain as mummies hanging to the branches, the larvae live, reach full growth and then pupate within the fruit. It was not determined whether the wounds of the apple weevil alone are sufficient to cause the apple to drop or whether the species is dependent upon assistance from fungous diseases and other insects in causing the apples to come to a condition which suits their requirements in reaching full development.

The egg is yellowish white, oval-oblong in shape, .015 inch wide and .020 inch long. All the eggs observed, with the exception of two, were deposited in punctures excavated from young apples by the female beetle. The two exceptions were cases where the eggs were

laid in the stems of apples. After the egg is laid the beetle ejects a small quantity of excrement which is plastered over the opening in the skin, thus effectually sealing the egg chamber. This is evidently done to protect the egg from predacious insects or mites. The time required by the beetle to make the puncture, deposit the egg and seal the hole was observed in one case to be thirteen minutes. Of about a dozen eggs that were laid on June 1 all hatched on June 5. In numerous other cases the period of incubation was found to be either four or five days. The exact number of eggs that one individual will produce was not determined. A record was secured, however, from two females that were caught a few days after oviposition was known to be in progress on the trees. The females, each accompanied by a male, were caught on May 29 and the pairs confined separately in glass jars. Fresh apples were placed in the jars each morning and the old ones removed

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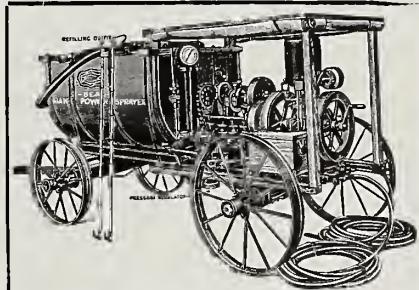
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and the eggs counted. One of the females lived until June 25, a period of 26 days, and laid 119 eggs. The other lived until June 30, a period of 31 days, and laid 66 eggs. The greatest number laid by one beetle during any one day was 10. Egg laying by the beetles on the trees seemed to be the most rapid during the period from May 25 to June 15.

The larva is a robust, wrinkled, footless grub about one-eighth of an inch in length. Its color is yellowish white, but when feeding on decayed apples the contents of its digestive organs give it a darker appearance. The head is light brown, the jaws dark brown to black. The body is sparsely covered with short hairs, more numerous near the head. From the head the diameter of the body increases gradually to the eighth segment and then decreases more rapidly to the posterior extremity. The larva is always found in a curved or curled up position, and when removed from the apple it moves awkwardly on its side or back and is unable to straighten out and crawl on its belly like the larva of the plum curculio. The larval period was found to vary greatly in length, ranging from eighteen days in one case to fifty-three days in another. Its average duration seemed to be about thirty days. The larvae are able to subsist on apples that are in almost any condition of soundness or decay, except those that are growing vigorously on the tree. Sound fallen apples, those that are soft and slimy with decay and those that are shriveled and dried until they are almost as hard as wood, seem to afford the insect acceptable food. Apparently the condition of the apple in which the insect was feeding did not greatly affect the duration of the larval stage. In many cases in the orchard from three to five larvae were found developing in one apple, and in the laboratory as many as twenty reached the beetle stage within a single fruit.

The larvae change to delicate white pupae in cells which they make in the tissue of the apple. These cells are just large enough to accommodate the body of the insect and may be located at any place within the apple from near the skin to the core. The exact length of the pupal stage was observed in only four individuals. In each of the four cases it was eight days. The development of other individuals that were watched less closely indicated that in some cases the stage may be of longer duration, though the exact time was not noted. It is also probable that with some it is less than eight days. This was indicated in the instance of one precocious individual which accomplished the entire transformation from the laying of the egg to the adult insect in thirty days.

One parasitic insect was reared from the apple weevil in the manner described as follows: On July 7 an apple was cut open that contained a full grown weevil larva. Adhering closely to the side of the larva was another minute white larva that was

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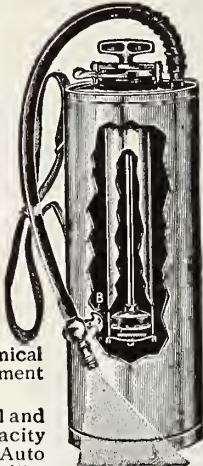
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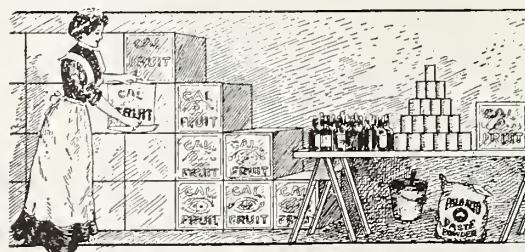
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recognized as a parasite. The two were carefully removed into a breeding bottle and kept under observation. The parasite developed very rapidly in size, and two days after being placed in the bottle it had killed and almost entirely devoured its host. When its food was gone it constructed a delicate cocoon of white silk beside the shriveled skin of the insect it had destroyed. Within this cocoon it changed to a pupa on July 13, and on July 20 it emerged from the cocoon as a small, yellowish-brown four-winged insect. The insect was sent to Washington, where it was determined by Mr. H. L. Viereck as Bracon anthonomi Ashm., a species that was reared in 1892 from the strawberry weevil, Anthonomus signatus, by Dr. F. H. Chittenden of the United States Department of Agriculture.

The weevils usually remain in fallen apples for a week or more after they drop, and any method of destroying the young apples that accumulate on the ground early in the season will dispose of many of the insects. A part of the orchard at French Creek, in which the investigations described in this article were carried on, was sprayed with arsenate of lead to control the codling moth and plum curculio. No apple weevils were found on the sprayed trees, and the fruit, which was observed closely, showed no injury from this species. The habit which the beetles have of feeding on apple foliage makes it clear that they are within the reach of poisonous sprays and explains their apparent absence on the sprayed portion of the orchard. There is little doubt that many of the beetles are killed by swallowing the poison that adheres to the leaves of sprayed trees. The beetles can be caught with sheets in the manner described for dealing with the plum and apple curculios, but, as has already been stated, the jarring of large apple trees is not often practicable.

A. B. Ansbacher & Co. are the first producers of Arsenate of Lead of such perfect, neutral and pure quality that it can be sold in steel packages and not corrode the package. The failure of the wood package for the 100, 50 and 25-pound sizes of Arsenate of Lead Paste has been a great source of annoyance, trouble and loss to the growers and dealers. The steel packages keep the contents in perfect physical and chemical condition in either dry or wet climates for years. They can be opened and closed easily, allowing part of the contents to be used and keeping the remaining part a perfect soft paste. While the neutral condition of "Triangle" Brand Arsenate of Lead is very important, it is just as important that the paste does not dry out or form hard lumps which are worthless to the grower; drying also changes the balance of the Arsenate of Lead so that the grower does not know what quantity to place in the spray tank. The failure of the wood package has been the only worthy argument in favor of the dry powdered Arsenate of Lead, and because the steel package is now in use for "Triangle" brand the growers will not have to pay the high cost and double freight charges on the dry powder in order to get uniform poison. A. B. Ansbacher & Co. write that they are warranted by results in claiming that their "Triangle" brand is the perfect product in the perfect package. Others will imitate the package, but they cannot equal the product in purity, fineness, safety and killing speed. They invite the most thorough and exacting comparative tests with all other kinds of Arsenate of Lead. *

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Two Species of Apple Tree Borers

By H. F. Wilson, Assistant Entomologist Oregon Agricultural College

OF the two species given, the "Flat-Headed" apple tree borer (*Chrysobothris femorata* Fab.) and the "Round-Headed" apple tree borer (*Saperda candida* Fab.) only the first is at present known in Oregon. However, since the second species is ordinarily the more serious in the Eastern States and may appear here at any time, it is thought well to give an account of it.

The Flat-Headed Apple Tree Borer.—The records of the entomologists at the Oregon Agricultural College show that there has been reported injuries of this species in Oregon for the last fifteen or twenty years, and that these injuries are principally upon two or three-year-old trees. With the large number of young trees which have been set out during the past few seasons these reports have grown more numerous, and a considerable number of trees have been reported as killed. Usually the fruit grower notices that some one or more trees planted the previous season appear unthrifty. Upon examination the trees are found to be attacked at a point near the surface of the ground by a long, flat, broad-headed

worm, which has worked along under the bark cutting a long channel and usually girdling the trees. The place of infestation may be detected by the discolored bark covering the tunnel made by the borer. The adult of this insect is a greenish, metallic brown beetle measuring about a half-inch in length. The body above is flattened, and in fresh specimens is coated with a grayish powder. The under side of the body is bronze colored. The adults come out in the spring, and after mating the females begin laying eggs upon the bark; and the forthcoming larvae bore into the bark, excavating a broad burrow just under the outside layer. The broad heads of the larvae cause the necessity of a wide burrow, and as the insect grows the channel is made wider, so that finally it may be three-eighths of an inch or more in width. The larvae continue feeding throughout the summer, and when full grown bore directly into the sap wood of the tree, pupate, and, remaining there until spring, come forth as adult beetles. Reports of injury usually come in the fall of the year, as it is then that the insect has finished its work and the tree begins to show the effect of the injury. In the case of large trees the insect probably goes deeper into the wood from the beginning, where it feeds and lives until ready for pupation. In other sections of the United States it has been reported as working mostly in the parts of the tree ranging from the base of the trunk to the limbs.

There seems to be a difference of opinion regarding the health condition of the trees attacked, but in Oregon the first signs of trouble appear as a result of the damage caused by the insect itself. Besides the apple, a number of other trees are attacked, as the pear, peach, prune and some shade and forest trees. Clean culture should be thoroughly practiced, and nurseries should not be located near infested orchards. When a tree seems to be injured beyond recovery it should be removed and burned, so as to get any larvae or pupae which may be present in the

infested tree. Perhaps the most prevalent methods are mechanical barriers. These may be defined as something placed about the trunk of the trees so that the adults cannot lay their eggs upon the bark. Newspapers or untarred building paper will do for this purpose if bound with string and tied at top and bottom so as not to permit the beetles crawling under. The string used should be such that the expansion of the tree can break it, should the growth be excessive. Window screen may be used, but must be placed far enough away from the bark

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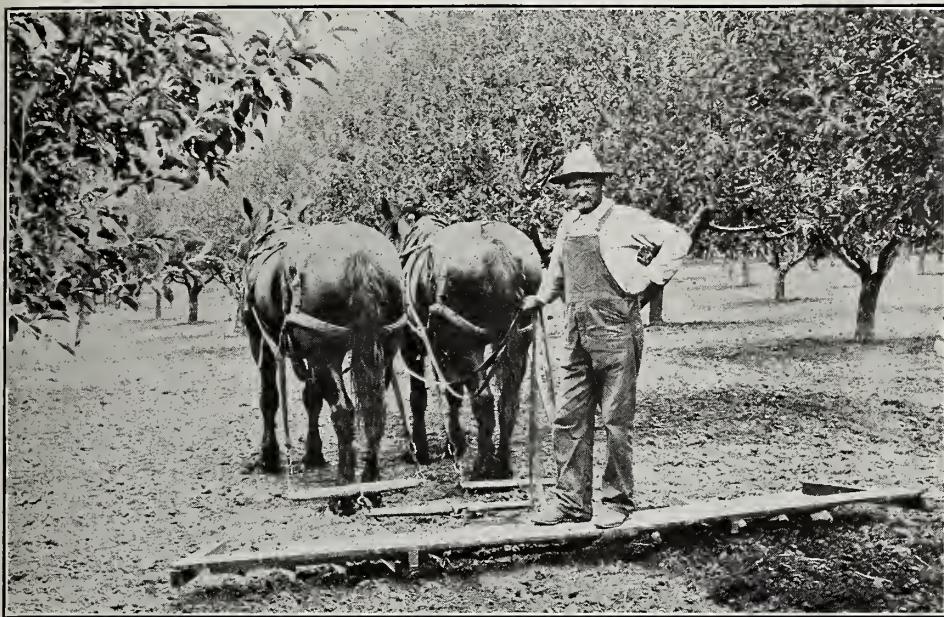
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so that the eggs cannot be laid through the meshes of the wire. Cotton should be placed about the opening at the top so that the beetles cannot crawl under. In the case of any of these barriers the dirt should be mounded up above the base of the tree so that the adults cannot crawl under them at the bottom. A good stiff whitewash, containing crude carbolic acid and arsenate of lead, should be applied to the trunks of the trees above the barriers. If the orchardist thinks these are too troublesome, perhaps the whitewash applied to the entire trunk will act as a deterrent.

The Round-Headed Apple Tree Borer. It has been stated that this insect probably causes the death of more young trees than all other natural agents taken together. In 1872 Mr. D. B. Wier of Wisconsin wrote that in his opinion this pest is one of the worst attacking fruit trees, and stated that it would probably destroy 5,000 out of every 10,000 young trees within three years. A Mr. Powell of Ghent, New York, is mentioned as having, in 1889, reported the removal of thirty grubs from a single tree. The first indication of the presence of the insect is in the unthrifty appearance of the trees and the sawdust-like castings thrown back by the larva which fills up the burrow after and it tends to keep out such enemies as could get in that way. Close observation will show very distinctly the discolored bark above the borer. Where grasses and weeds are allowed to grow about the trunks, the injury is liable to be more severe, due to the concealment afforded the adult beetles.

The adult beetles make their appearance in late spring and, flying about at night, the females make incisions in the bark, where they place their eggs and cover them with a thick, gummy fluid. The egg is somewhat flattened, pale, rust-brown in color and measures one-eighth of an inch long by about one-twenty-fourth inch in width. The young larvae, soon after hatching from the egg, burrow through and under the bark, and, feeding in the sapwood, work their way upward and then downward. About three years are required for the full development of this species, and for the major part of that time it is in the larval stage, feeding and developing through the summer months and remaining inactive at the lower end of the burrow during the winter. When mature, the larva burrows outward to the bark, constructs pupal cells and changes to the pupal form. It remains in this stage for several weeks, according to Dr. Chittenden, and then gnaws through the bark, forming a round opening through which it emerges. The adult beetle is brownish in color, with the antennae and legs a light gray. Along the back there are two white bands which run the length of the body and are more widely separated at the middle of the back than at the ends. The remedies used for the preceding species will apply for this species, although it is not necessary to apply them as far up the trunk.

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Directions for Making Spraying Preparations

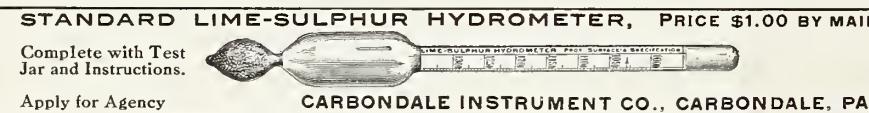
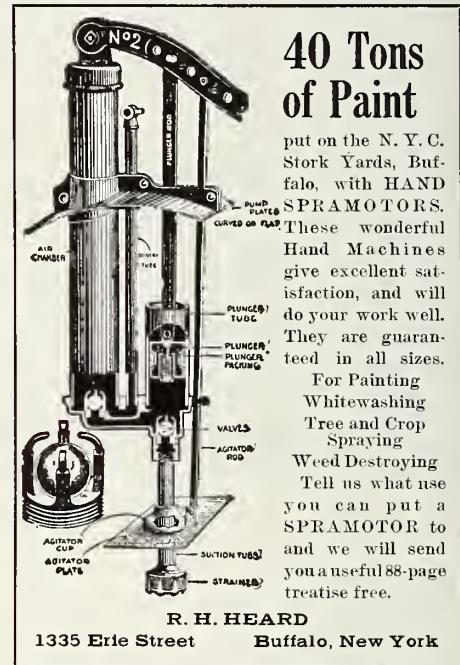
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similar nature. Injury to the foliage of plants following the application of bordeaux mixture and other sprays is of common occurrence. Much of the injury reported or observed is preventable. The principal sources of injury as determined by observation are (1) use of improper or impure materials, (2) carelessness in making the mixtures and (3) improper and ineffective application. The first two of these sources of difficulty can be entirely eliminated and the third greatly mitigated by reasonable attention and supervision. Formulas must be respected and small details of practice must receive attention in order to attain best results.

Bordeaux Mixture: Four pounds copper sulphate, 4 pounds lump lime, 50 gallons water.

To make small quantities of bordeaux mixture for use in the home orchard the equipment should be two tubs holding about 30 gallons each and a small slaking box. For the tubs oil barrels, cut in halves, are sufficient. Dissolve the four pounds of copper sulphate in the water by suspending it in a coarse sack in the top of a tub containing 25 gallons of water. Slake the lime in the box, being careful that only sufficient

water is used to get a fine quality of lime putty without burning the lime. Strain this through a fine thirty-mesh sieve into the second tub and dilute to 25 gallons. Then, after stirring both the lime and copper sulphate, pour the two simultaneously through a strainer into the spray tank, stirring thoroughly as the two are being run together. Where large quantities of bordeaux mixture are to be made it is well to prepare stock solutions of the copper sulphate and lime before the spray season opens. These stock solutions are generally made up so that each gallon of the spray contains one pound of material, although a strength of two pounds to the gallon is used at times. The stock solution of copper sulphate is prepared by placing 50 pounds of the crystals in a coarse sack in the top of a barrel containing 50 gallons of water, and a stock solution of lime is prepared by taking 50 pounds of lump lime, slaked to a putty, and diluting to 50 gallons. The lime putty is made by slaking 50 pounds of lump lime in a shallow lime box, using care that only sufficient water is added to slake the lime and not allow it to burn, and after the violent action is over to allow the



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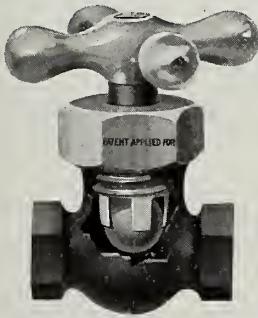


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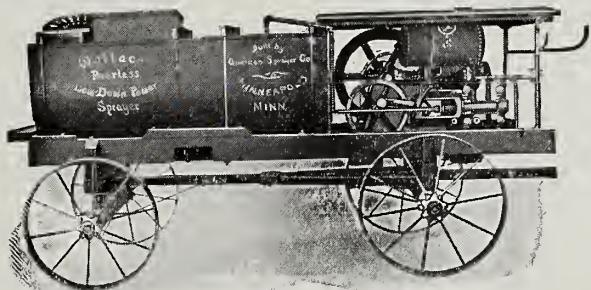
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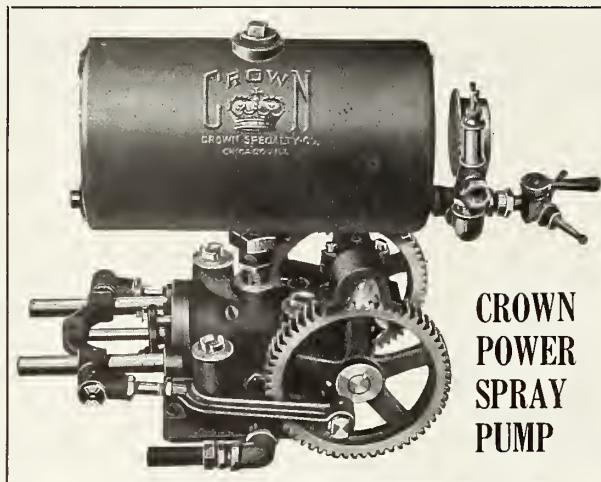
putty to stand a short time before adding the rest of the 50 gallons of water. The success of the bordeaux depends so much upon the lime used that the following extract from a recent bulletin is of interest: "The two common faults observed in practice are: First, the addition of too little water, which results in the development of too much heat and the 'burning' of the lime. In this case there are many small lumps that do not completely slake and will be thrown out when the lime is strained into the tank. The second fault is the addition of too large an amount of water, resulting in 'drowning' of the lime. This likewise results in incomplete slaking, and therefore a reduction in the actual amount of lime added to the mixture. In some cases where the lime is neither perfectly fresh nor of great purity these losses may so reduce the amount that the copper is not all precipitated and serious injury follows. Lime, during the process of slaking, should have constant attention; water should be added in small amounts as needed to keep the action even and to insure that perfect slaking which can be obtained in no other way. It is best to slake a definite number of pounds and when thoroughly slaked transfer to a barrel containing such amount of water as, added to the quantity used in slaking, will give a milk containing a definite quantity of lime to the gallon. Having the stock solutions prepared, the next step is dilution preparatory to mixing. The diluting tubs should each have a capacity in excess of one hundred gallons. A palm oil cask of 250 gallons capacity, cut in half, will supply two tubs that serve the purpose admirably. We will suppose that the standard 4-4-50 formula is to be used and that the mixture is to be made in lots of 200 gallons. In one diluting tub place 16 gallons of the stock solution of copper sulphate, made up one pound to the gallon, then add 84 gallons of water. The first lot should be carefully measured and the height at which it stands in the tub marked, so that in filling for succeeding mixtures it is only necessary to fill to the mark. Thoroughly agitate the milk of lime and, if it has been made up one pound to the gallon, transfer 16 gallons to the other tub and fill up with water in like amount as for the copper sulphate solution. We now have 100 gallons of copper sulphate solution and an equal quantity of milk of lime. This is on the plan of full dilution before mixing, which has been shown by experience to possess advantages over other ways of mixing, such as adding concentrated solution of copper to fully diluted lime, or concentrated lime to fully diluted copper sulphate, or combining the two ingredients in concentrated form and then diluting. The resulting mixture, made by full and equal dilution, settles less rapidly, is less frequently injurious and attains a maximum of adhesiveness. These points of difference have been determined by field and laboratory experiments with mixtures made in the different ways, and we have no hesita-

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tion in urging equal and full dilution before mixing as being the best plan to follow. In mixing, equal streams may be conducted directly into a strainer supported over the receiving tank, or the streams may meet in a short trough which terminates on the strainer. Before starting the streams the milk of lime must be thoroughly stirred, and this agitation should continue until the mixing is completed in order to insure uniformity in the combination." Bordeaux mixture attacks iron, and for this reason it is best to use brass or copper measures and strainers, wooden pails and a spray pump with brass parts, especially where they come in contact with the mixture. Fresh bordeaux is advised, for any bordeaux mixture which has stood over night or settled thoroughly may prove unsafe.

Lime and Sulphur for Use on Foliage: One gallon commercial material (previously mentioned), 30 gallons water.

Measure the water for the spray into the spray tank and add the lime and sulphur, agitating thoroughly. This spray has proven of value for use against apple scab while the trees are in leaf.

Self-Boiled Lime and Sulphur: Eight pounds flowers of sulphur, 8 pounds lump lime, 50 gallons cold water.

Place the lime and sulphur together in a barrel and add just enough cold water to slake the lime, stirring constantly to prevent burning. Keep a piece of old carpet or burlap sack over the top of the barrel to retain all the

heat possible. Watch the mixture carefully, and as soon as an orange colored liquid starts to gather on the surface add the rest of the water. Strain through a fine sieve to remove the particles of lime, but work all the sulphur through. This spray is proving very satisfactory as a summer spray on the peach against the brown rot and scab. Do not use hot water or allow the mixture to stand after the lime is slaked and before dilution. In this spray we do not want the soluble sulphur (orange colored) to form, for these will injure the foliage and fruit.

It is found desirable at times to combat both the insect pests and fungi on one application of the spray, and for

this a combination of the insecticide and fungicide is used. This results in a saving in the cost of labor and time spent in spraying. The combinations given below are used with success in Illinois:

Bordeaux-Arsenate of Lead: Two pounds arsenate of lead, 50 gallons bordeaux mixture; or, 10 ounces arsenate of soda, 24 ounces acetate of lead, 50 gallons bordeaux mixture.

Prepare the commercial arsenate of lead by working into a smooth paste and add it to the diluted milk of lime. Prepare the home-made arsenate of lead according to the directions given under arsenate of lead and mix with the milk of lime. Then bring the fully diluted copper sulphate solution and the milk of lime together in the manner



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Why buy Arsenate of Lead in leaky wooden kegs when you can buy it in airtight steel containers? Every container is full weight, too. We guarantee not less than 15% arsenic oxide and not more than 50% moisture. On account of the fine physical condition of Bean Spray Arsenate of Lead you can work it up ready for use in the can. It is not necessary to "add water slowly while rubbing to a thin paste," which is necessary with other lead arsenates. When the container is empty use it for an orchard heater.

Stock carried in Portland and San Jose. Send for our new Spray Booklet.

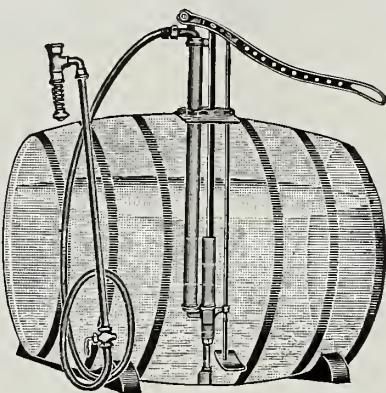
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Jones, Post & Co., 601 Liberty Street, Kansas City, Mo.

described in making bordeaux mixture. Where a stronger poison is desired the arsenate of lead can be increased to three or four pounds. A more uniform distribution of the arsenate of lead is secured throughout the spray when it is added to the milk of lime instead of placing it in the spray tank.

Bordeaux-Paris Green: Four ounces paris green, 50 gallons bordeaux mixture.

Mix the paris green into a thin paste and add to the milk of lime and pro-

ceed to mix the bordeaux according to the direction already given.

Lime-Sulphur and Arsenate of Lead: Two pounds arsenate of lead, 1 1/4 gallons commercial lime and sulphur, 48 gallons water; or, 2 pounds arsenate of lead, 50 gallons self-boiled lime and sulphur.

Have the arsenate of lead in the form of a smooth paste and add to the lime and sulphur solution, at the same time stirring the spray thoroughly. If a power sprayer is used it is advisable to keep the agitator working.

For the proper application of spray materials it is necessary that we have a well arranged place to prepare the spray. This will vary with the extent of the operations and the acreage to be sprayed, but should be ample. Small quantities of the spray can be prepared in large candy pails or small kegs, reducing the formulas in proportion to the amount of spray desired. The better the equipment the less troublesome and disagreeable will be the spray operations. A good pump should be simple, compact, light, durable and have ample capacity to do the required work quickly and easily. A pump with few projecting parts, with brass valves and cylinder, and with an outside packed plunger will prove the most satisfactory. For use in the home garden, on the small bushes and trees, as well as in the greenhouse, there is no pump more suitable than some form of the auto-sprayers or the bucket pumps. These pumps, in brass, can be obtained from any seedsman or florist for about \$7 for the auto-sprayer and for \$3.50 or \$4.50 for the bucket pump.

Where there are several large trees to be sprayed the use of a larger pump will be desirable. The barrel pump will serve where the acreage to be sprayed is three or less. These pumps are made to be fitted either in the end or side of a barrel. Usually a good kerosene oil barrel is used, with the pump in the end, for the pump is more easily operated at this height. There are many different barrel pumps which are giving satisfaction. These pumps

vary in price from \$10 to \$18 and are all capable of maintaining a pressure of sixty to eighty pounds when operating one line of hose with two Vermorel nozzles. When the acreage to be sprayed is less than ten and more than three a tank pump is more suitable. This is a double acting pump with a plunger of two and one-half to three inches in diameter and a large air chamber, so that a steady pressure of 100 pounds can be maintained. These pumps are designed to supply two lines of hose carrying four to six Vermorel nozzles. A pump of this character should be mounted upon a tank holding about 200 gallons. Pumps of this general type can be obtained at prices ranging from \$25 to \$30.

The use of a power sprayer will depend a good deal upon the capital, amount and price of labor and the acreage to be sprayed. Where there are ten or more acres to be sprayed during the season some form of a power outfit will be useful. Power may be obtained from the traction of the machine, compressed gas or air, gasoline or steam. The two most used are the traction and the gasoline machines. Where small fruits, strawberries, grapes and plants of that type

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are to be sprayed the traction machine is satisfactory. These machines have a pump driven by a wheel and the pressure is maintained by means of storage tanks. Special fittings are provided for spraying rows of berries or potatoes. These attachments are provided for use with the hand outfits when desired. The gasoline sprayer can be obtained from different manufacturers at prices ranging from \$275 to \$400 for the complete mounted outfits.

Besides the spray pump the outfit for spraying will need hose, nozzles, extension rods, strainer, measures and barrels for the spray mixture. The spray nozzle which is proving very satisfactory now is of the Vermorel type, of which the "Friend" is a very popular style. This form of nozzle is sold by all the dealers in spraying supplies 19925 Bet Frt Morath 1-18-12 FIVE under one name or another. These nozzles will cost 75 cents to \$1 each. The small type of Vermorel is still the most satisfactory nozzle for general use, and these can be obtained from dealers in spraying supplies, as can the rest of the accessories needed in spraying. The hose should be of high grade, one-half inch or three-eighths inch in diameter and five to seven ply, and for general use lengths of 25 feet will be sufficient. Sherman clamps are the best to hold the hose on the couplings, especially where subjected to any strain. The extension pole is of bamboo, ten to twelve feet long, and lined with brass or aluminum tubing; couplings are provided for attachment of the hose and nozzles. The cut-off valve should work with a half turn. For a strainer, one with thirty meshes of brass wire to the inch will be the most serviceable; the style will vary with the capacity. Taking the cost of the complete equipment into account a spray outfit for use in the home garden will cost \$10 to \$12, while the equipment for the barrel pump will cost \$30. The larger outfits will cost more in proportion, for they will require a more extensive outfit for preparation of the spray.

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You want three things in a wire fence: 1, a fence that will give years of satisfactory service; 2, the style and height best suited to your purpose; 3, and at a reasonable price. Our prices

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Save the DEALERS PROFIT and get a better fence. Kitselman Fence Lasts for Years. 100 styles and heights. Catalogue FREE.

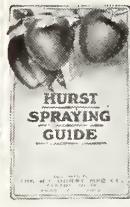
KITSELMAN BROS. Box 67 Muncie, Ind.

HURST POWER SPRAYER ON FREE TRIAL

Our no-money-in-advance plan protects you. If after testing this sprayer you are not satisfied with its work, return it to us—the trial does not cost you one cent. The Hurst is regulated by our own device which relieves the pump and engine of all strain when the nozzles are shut off. 200 gallon cypress tank, 2½ horse-power frost-proof water-cooled engine that never fails, cyclone agitation, large capacity pump, strong and durable. Guaranteed for 5 years. We pay freight.

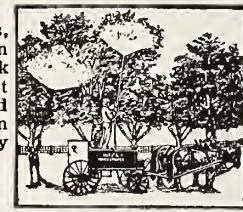
THIS SPRAYING GUIDE FREE

TO OUR CUSTOMERS



Shows all the different pests and diseases, describes, gives remedy and complete instructions for each, in plain language easily understood. This valuable book should be in the hands of every farmer and fruit grower. Write today for our big catalog, condensed spraying guide and special free sprayer offer to first in each locality. Don't delay—write today and save money.

THE H. L. HURST MANUFACTURING CO.
8221 North St., Canton, Ohio



BEAN SPRAY HOSE IS GUARANTEED



It is made by a special process to resist the action of corrosive and oily sprays, and to withstand the heavy pressure to which spray hose is subjected. Bean Spray Hose wears, and wears, and wears. Furnished in any length in multiples of 5 feet. Fitted with our long shank couplings. Per foot 23 cents. Order from your local dealer or send to us. We prepay transportation.

BEAN SPRAY PUMP CO. 213 WEST JULIAN STREET
SAN JOSE, CALIFORNIA

DO YOU WANT A HOOD RIVER APPLE ORCHARD?

Have some of our 1500 acres developed for you

BONEBORO ORCHARD CO.
HOOD RIVER, OREGON

25,000 1-Year-Old Apple Trees for Sale

Some A1 Jonathans, Rome Beauties and other good varieties. They run from 4 to 5 feet high and from $\frac{3}{8}$ to $\frac{1}{2}$ inch caliper. Now is your chance to secure some good stock from a nurseryman of 20 years' experience.

Address ALBERT MATHIS, PAYETTE IDAHO

FREE EXPERT ADVICE

By Professor A. Van Holderbeke, five years Washington State Horticulturist,

TO FRUIT GROWERS

Purchasing high grade nursery stock, guaranteed true to name, from the

Van Holderbeke Nursery Company

Main Offices:
Columbia Building
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RELIABLE
AGENTS
WANTED

Nurseries:
Spokane Valley and
Kennewick, Washington

We Do Not Believe

nishing good, clean, healthy stock. We are willing to match our stock and service against any nursery in the world. For several years we have been supplying most of the trees planted in the famous Wenatchee Valley, and the tens of thousands of growing trees, furnished by us, speak louder than words.

We have a large and complete line of fruit and shade trees, ornamental shrubs, vines, roses, etc.

Our Customers Get What They Order

COLUMBIA & OKANOGAN NURSERY CO.

Wholesale and Retail

Wenatchee, Washington

Non-Irrigated, Whole-Root Trees

We have them. Write us your wants. We pay freight and guarantee arrival in good condition. A Few Reliable Salesmen Wanted.

PACIFIC NURSERY COMPANY, 1205 Yeon Bldg., Portland, Oregon

Nursery Catalog

NEW, HANDSOME, INSTRUCTIVE, UP-TO-DATE

Describing Fruit and Ornamental Trees, Shrubs, Vines, Roses, Berry Plants, etc.

Free on request. Write now, mentioning this paper

J. B. PILKINGTON, NURSERYMAN, PORTLAND, OREGON

NOTICE—SPECIAL SALE

Apple Trees, Peach Trees, at prices that are lower than the lowest, and for trees that cannot be surpassed by any. Also full line of other nursery stock. Write for special list, mentioning "Better Fruit," to

J. H. LAUTERMAN, SALEM, OREGON

CHICO NURSERY COMPANY

GROWERS OF

High Class Nursery Stock

The best that good soil, care, skill and long experience can produce

Write us for prices on Grape Vines, Cherries, Apples, Peaches, Pears, Nut Trees, Ornamental Shade Trees, Flowering Shrubs and Roses
Peach Seed For Sale. Catalogue Free

CHICO NURSERY COMPANY, Chico, California

Hood River Valley Nursery Company

Route No. 3, Box 227

HOOD RIVER, OREGON

Phone 325X

Will have for spring delivery a choice lot of one-year-old budded apple trees on three-year-old roots, the very best yearlings possible to grow. Standard varieties from best selected Hood River bearing trees—Spitzenbergs, Yellow Newtowns, Ortleys, Arkansas Blacks, Gravensteins, Baldwins and Jonathans. All trees guaranteed first-class and true to name. Start your orchards right with budded trees from our nursery, four miles southwest from Hood River Station.

WILLIAM ENSCHEDE, *Nurseryman*

H. S. BUTTERFIELD, *President*

MR. PLANTER: We are ready to serve you when you are ready to buy your **TREES**

We can satisfy you both as to **QUALITY** and **PRICE**. Our trees have the highest possible developed **ROOT SYSTEM** and are **TRUE TO NAME**.

Send for Catalog and Prices

Yakima and Columbia River Nursery Co.

NORTH YAKIMA, WASHINGTON

Salesmen wanted

Write for terms

MINNESOTA FRUIT GROWERS PLAN TO ORGANIZE

AT the meeting of the State Horticultural Society which ended last week a great deal of discussion regarding improved methods of grading, packing and marketing was entertained. Growing out of this, a meeting was called on the last day of the session to consider plans for organization. It was decided to organize an association of fruit growers. The idea in the minds of the men in the meeting was to have this sort of federation of local associations already formed in the state. It was further brought out that the association should also help isolated growers, for there are as yet but few local growers' associations in the state. The principal object should be to connect the growers in certain parts of the state with the markets which lie in the extreme parts of the state and in the states adjoining. A committee of five persons was appointed to draw up a constitution and by-laws and submit them for ratification. Some thirty influential growers of the state signified their willingness to back such an organization. A meeting will be called in the near future to adopt a constitution.

ABOUT PLANTING TREES

When you are sick do you employ an inexperienced physician, or when in business troubles an attorney who has just been admitted to the bar? Then why, when the important step of planting a commercial orchard is contemplated, should you not use the same discretion and insist on getting trees that are grown right, propagated from trees that have proven their value and annually bear large crops of select prize-winning fruit?

The planting of an orchard is an epoch in your career, and before undertaking the work it is a good thing to make a careful investigation into the relative merits of the trees you intend to plant. Be sure that they are propagated from trees that are early, abundant and regular bearers of fancy fruit.

The mistake of an attorney may be corrected by court, those of the physician can be buried, but those of an orchard stand as lasting monuments of folly and reproach. THE CHARACTERISTICS OF THE PARENT TREE APPEAR AGAIN IN THE YOUNG TREE AND ITS FRUIT. In selecting the trees for your orchard choose those that have the money-making features and thereby assure certainty of results.

Our Northern Grown Nursery Stock is propagated from trees that are early and prolific bearers of fancy fruit. Buy our pedigreed stock and get results.

THE NORTHERN NURSERIES
Box 418 CHEWELAH, WASHINGTON

The Best Part of Michigan

is Oceana, the most western county in state. More rural schools, churches and telephones than any other county in United States. One hundred miles macadamized roads. Fruit is bringing up to \$1,000 per acre; wheat 40 bushels; potatoes 300 bushels; alfalfa and dairy coming fast. Write for list of farms.

HANSON & SON, Hart, Michigan

\$1.50—Each—\$1.50

The Kansas Pruning Knife

MADE BY
INTERNATIONAL TOOL CO.
of Detroit, Michigan

R. R. 1, Box 53, Montrose, Colorado

GOODELL STRAWBERRY PLANTS

WE ARE SOLE DISTRIBUTORS FOR THE PACIFIC COAST
WRITE US

Surplus Trees—One-Year-Old Stock

Attractive prices furnished for the following list on application:

APPLE

Delicious	15,800
Gravenstein	2,000
Grimes Golden	11,500
Jonathan	97,000
McIntosh Red	40,000
Newtown	80,000
Rome Beauty	80,000

APPLE

Spitzenberg	30,000
Stayman Winesap	7,000
Winesap	85,000
Wagener	40,000
Apricot—Moorpark	5,000
Pear—Bartlett	10,000
Peach—All varieties	30,000

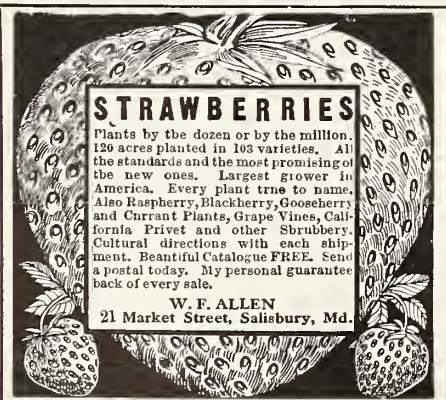
The Sunnyside Nursery Co.

SUNNYSIDE, WASHINGTON

Northern Pacific Demonstration Train

MONDAY, January 8, a completely equipped demonstration train left Moscow to take in every section of importance along the Northern Pacific lines in Northern Idaho; one car containing the exhibit from the Department of Horticulture and Agronomy from the University of Idaho and another car is devoted to livestock. The exhibit from the Department of Horticulture, in charge of Professor W. H. Wicks, occupies one entire side of the car. The material is arranged in a progressive way and includes all phases concerning the production of the apple from selecting the location for planting an orchard to various kinds of by-products. At the front end of the car is arranged various types of proper and improper kinds of trees for

planting in Northern Idaho. In this collection is represented the piece root and whole root grafted and budded trees. Also irrigated and non-irrigated stock is well displayed. This nursery stock represents the Wagener, Rome Beauty and Jonathan, all recommended commercial varieties for this part of the state. With this subject of planting is displayed models of all recommended systems of planting. The next section of the space is devoted entirely to spraying and economic control of insects and fungi. Here is found, mounted in chart form, all kinds of spray material, spraying equipment and insect pests and diseases. Directions for making home-made sprays and spraying calendars are well displayed. The last section of the space is devoted entirely to fruit packing. This display very forcibly sets forth all the commercial types of packing. The commercial varieties adapted to Northern Idaho are used in this work, so one can see the best style of packing to use with these varieties. During the time allotted to each stop for the discussion of horticulture the essential points in conducting commercial horticulture in a successful manner are covered. After this brief talk all those interested in the horticultural exhibit are given ample opportunity to examine each carefully and take up with the professor in charge problems of vital importance to each one.



WHEN WRITING ADVERTISERS MENTION BETTER FRUIT

Pomeroy Hardy English Walnut Trees

Ornamental Shade Trees and Profitable Orchards

Finely Illustrated Booklet Sent on Request

DANIEL N. POMEROY
English Walnut Farm, Lockport, N.Y.

PORTLAND WHOLESALE NURSERY COMPANY

Rooms 1 and 2 Lambert-Sargent Building
Corner East Alder Street and Grand Avenue

PORTLAND, OREGON

FAMOUS HOOD RIVER APPLES

Spitzenbergs, Newtowns, Jonathans, Arkansas Blacks, Ortleys, Baldwins, Winesaps, R. C. Pippins, Ben Davis, M. B. Twigs

Look Good, Taste Better, Sell Best
Grade and Pack Guaranteed

Apple Growers' Union
Hood River, Oregon

WHEN WRITING ADVERTISERS MENTION BETTER FRUIT



Hood River Standard Nursery Company.
Hood River, Oregon.

Gentlemen:—
Last Fall through the Baltimore Orchard Company, I purchased a quantity of assorted apple trees from you, the same being shipped to me by freight.
My idea in going to Hood River for trees was that the delicious and attractive fruit that is shipped into this market from Hood River impressed me that surely a community that could grow such fine fruit, certainly ought to be in good position to supply equally as good trees, and it gives me great pleasure to state, that out of the quantity that I purchased from you, not one of the trees have died nor are they blemished in any way whatsoever, and the growth far exceeds other apple trees purchased in this vicinity and planted at the same time.

Very truly yours,

Sept. 15, 1911.

"That's All— That is Enough"

A RECORD

that should be the most convincing proof to you of the quality of the trees produced by our nursery. THINK OF IT—shipped 3,000 miles, by freight, late in the season—planted late, in a different climate, a different soil—and ALL lived—outgrew everything else in the orchard. IS THAT NOT SUFFICIENT PROOF OF QUALITY?

REMEMBER

also, that all of our trees are grown on whole roots, non-irrigated—are bred from the greatest producers and most vigorous trees in Hood River Valley. They are the most carefully grown and carefully packed trees that you can purchase. They are in every sense a strictly thoroughbred, pedigree fruit tree. They cost no more, BUT THEY ARE THE KIND YOU NEED.

Write for our illustrated catalogue and price list

Hood River Standard Nursery Co.

'Phone, Odell 8 X 2

HOOD RIVER, OREGON

Branch Office, 401 Continental Trust Building, Baltimore, Maryland

P. S.—We want a few good live salesmen to represent us.

Hints On Boxes for Exporting Apples

A Recent Letter from Mr. R. R. Coburn of Chicago, Illinois

THE last number of your worthy paper came to my home Monday morning, and I must compliment you on the many articles and fine workmanship of your paper, especially your write-up on the different styles of firepots for the protection of fruit orchards in different localities where they are subject to early and late frosts. We will now take up the fruit box that you of the Northwest are using for export. In the first place, box material is too thin, especially the cover. The bulge ought to be removed entirely from the box. While on the docks in New York and Liverpool I had the occasion to watch the loading and unloading of both box and barrel apples. In the first place, the loading is done by putting a large quantity of box apples in a net, hoisting it aboard the steamer with a large hoisting crane. The same process is used in unloading the ship at Liverpool. You will readily understand the effect this will have upon tender apples, and also the very tender boxes they are put in. In Liverpool I met a dealer from Hamburg, who told me that nearly the whole face of some of the boxes were almost destroyed. The same complaint was also made by the Liverpool dealers. I am no boxmaker, and can give you no dimensions or sizes of boxes, but I think if you will take the bulge

off the box and thicken your material a little you will overcome the difficulty of export shipping to a large extent. I forgot to mention, while commenting on your firepot article, that my experience of forty years ago with firing a grape vineyard in Middle Michigan. Our vineyard contained about seventeen acres, and all we had to build fires with those days was refuse and sawdust from a mill. We found the necessity of creating a smudge for keeping it down amongst the vines, so we built our fire with fence rails and covered them with sawdust. The sawdust, being green and full of pitch, gave us a fairly good smudge, as we did not depend on the heat of the fire to keep the frost out. This process we kept up for three nights in succession and saved our entire crop of over one hundred tons of grapes, while our neighbors lost their entire crop. The bushel basket protection that I called your attention to is one of the simplest and best remedies I know of to protect all kinds of fruit in bushel baskets. As I wrote you in my previous letter, the post should be about three-quarters of an inch through, round and made of some soft wood. I forgot to mention that the bushel basket is being largely used in at least ten states: Texas, Georgia, Alabama, Tennessee, Illinois, New York, Ohio, Michigan, Wisconsin,

Missouri and other states, so you will see the necessity of putting in use this valuable post in the center of the basket. It is always put in before the basket is filled. Basket cover is scarcely one-eighth of an inch thick, and therefore requires this protection.



COULD YOU USE A GOOD SPRAYING CALENDAR?

We have just had a small circular printed which contains valuable information on when to spray, what to use, what to spray for, etc., as recommended by the Washington Experiment Station at Pullman, Washington. If you grow nothing more than a few berries in the back yard, you need this bulletin. Just drop us a card, and a copy will be mailed you free.

If you are in the market for anything in the nursery line, and want good, clean, thrifty, guaranteed stock, just mention it to us, and we will be glad to go into the matter with you. We have the finest block of all the staple varieties to be found in the West.

TOPPENISH NURSERY COMPANY

TOPPENISH, WASHINGTON

Located in the heart of the famous Yakima Valley

We need a few more live hustlers to represent us in good territory. Let us explain our proposition.

FRENCH FRUIT TREE STOCKS

READY FOR PROMPT SHIPMENT

Apple Seedlings, all grades
Pear Seedlings, 5-7 m.m. and 3-5 m.m.
Quince Stocks, 5-7 m.m.

AMERICAN FRUIT TREE STOCKS

Apple Seedlings,
Small surplus, all grades.

Japan Pear Seedlings,
Number One, Two, Three and Four.

APPLE AND PEAR GRAFTS

Our grafting season is now on. Order at once.

Large General Stock.

Write for Spring Wholesale Trade List.

The Shenandoah Nurseries

D. S. LAKE, Proprietor

Shenandoah, Iowa

State Agricultural Experiment School

Bulletin of Washington Agricultural Experiment Station

THE month of December marked a new and important step in the development of practical agricultural education in this state. The people of Lynden, Whatcom County, in co-operation with the Agricultural Extension Department of the State College, held a six-day dairy school. In like manner the people of Cashmere conducted a six-day horticultural school. The college furnished the instructors and the communities provided all local accommodations, equipment and supplies. The Great Northern Railway furnished a special car for the transportation of apparatus and equipment. Both schools received the enthusiastic approval of their respective communities, and both paid out financially. Better still, each of them left a strong and permanent influence for better agricultural and improved rural conditions.

At Lynden, December 11-16, over two hundred farmers and farmers' wives enrolled for the school. The average daily attendance was one hundred and

fifty. Several farmers drove from eight to twelve miles each morning and evening, while others came in on the train. A number of the rural schools excused their older pupils and allowed them credit for attending the course. Nearly every man had cows to milk and chores to do, but they hustled, and every morning the lectures began promptly at 9:20. The laboratory and demonstration work concluded at 3:45 each afternoon. Five members of the college staff and one assistant gave instruction in dairying, soils, poultry and home management. At the close of the first day's work several men said: "Well, that lecture on soils and this afternoon of cattle judging have been worth the cost of my ticket for the whole week."

At Cashmere, December 18-23, three hundred people registered for the course, while the average daily attendance was above two hundred, and just the week before Christmas. There the work was in charge of seven members

FACTS ABOUT APPLE GROWING

The healthier the tree, the better the fruit. The longer trees are sprayed with "Scalecide," the more beautiful, healthful and fruitful they become. Mr. Geo. T. Powell, President of the Agricultural Experts Association, has used "Scalecide" exclusively for the past six years on his 160 acre orchard at Ghent, N. Y. He gets twice the price for his apples laid down at his Railroad Station that the growers do in Hood River. Mr. J. H. Barclay, of Cranbury, the acknowledged champion apple grower of New Jersey, has taken all the first prizes for the past four years at the New Jersey Horticultural Society meetings. He has used "Scalecide" exclusively for the past six years. Men who *KNOW* use "Scalecide." A postal request to Dept D will bring you by return mail, free, our book, "Modern Methods of Harvesting, Grading and Packing Apples," and new booklet, "SCALECIDE, the Tree-Saver." If your dealer cannot supply you with "SCALECIDE" we will deliver it to any R. R. Station in the United States east of the Mississippi and north of the Ohio Rivers on receipt of the price; 50-gal. bbls., \$25.00; 30-gal. bbls., \$16.00; 10-gal. cans, \$6.75; 5-gal. cans, \$3.75. Address, B. G. PRATT Co., 50 Church St., New York City.

Make Your \$5,000 Farm Worth \$25,000

A farm that yields \$1,000 a year is worth, say, \$5,000; if it yields \$5,000 a year it is worth \$25,000, and so on. It takes good management and *many* acres to produce \$1,000 net each year raising grain and stock. Good management on only a few acres will produce \$1,000 net a year growing fruit.

ORCHARDS DO IT They Are Safe and Profitable

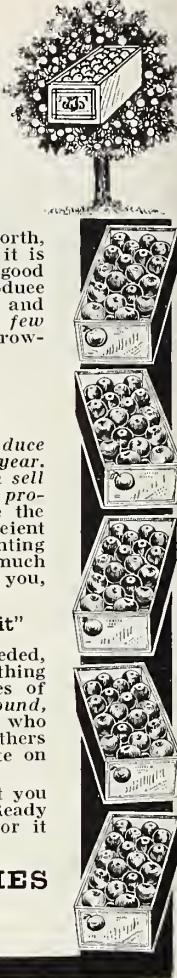
With modern methods *you can produce large crops of perfect fruit every year*. Market demands are such that *you can sell this fruit for at least three times the producing cost*. Granted that you have the ambition and the energy, and sufficient capital, you are absolutely safe in planting an orchard. If you know how, so much the better; if not, don't let that hinder you, we'll tell you how.

"How To Grow and Market Fruit"

Explains what is needed, why it's needed, and then directs you how to do everything required. Nearly 150 pages; 24 pages of pictures that *show how*; strongly *bound*, will last for years. Free to customers who buy \$5 worth or more of trees. To others the price is 50 cents, subject to rebate on \$5 order.

Our live 1912 catalog tells you what you ought to know when you plant trees. Ready in February, and sent free. Write for it today.

HARRISON'S NURSERIES
Apple Ave., Berlin, Maryland



of the college staff and instruction was given in the various phases of fruit growing, orchard pests, soils, fertilizers, poultry and home management. Special sessions devoted to fruit marketing and irrigation were addressed by the leading authorities of the state on these questions. Lectures began promptly at 9:30 each forenoon, while the afternoons were devoted to practical field and pruning work in the orchards. As at Lynden, the interest was intense.

The sole purpose in all work of this sort is the rapid and permanent improvement of agricultural conditions in our state. The movable school has demonstrated its value, and the Extension Department of the State College hopes to conduct several such schools in different parts of the state during 1912.

NURSERY STOCK

High grade, varieties true, no disease. Freight paid to your station. Full value for your money and satisfaction guaranteed. Write at once for new descriptive price list.

NEW HAVEN NURSERIES
Dept. D New Haven, Missouri

**50-GALLON
BARREL**
delivered to any railroad station in the United States, \$30

SALEM HEIGHTS NURSERY

Royal Ann, Bing and Lambert Cherries, on true Mazzard roots and guaranteed true-to-name a specialty. Scions cut from selected bearing trees. Also a fine stock of Spitzenberg, Yellow Newtown, Jonathan and Delicious Apples, Berry Vines and Bushes, and Choice Roses.

Write what you want and I will quote you living prices

H. H. CROSS, 532 North Liberty Street, Salem, Oregon

WE HAVE ONLY A FEW THOUSAND OF THOSE

Yellow Newtown, Spitzenberg, Ortley, Arkansas Black and Winter Banana

that you saw a photo of in the October and November issues. We have some small lots of other leading varieties, as well as pears, cherries and peaches.

Bear in mind that these trees were all grown on well drained virgin soil, on No. 1 whole roots, all buds selected from the best bearing trees in Hood River, and we guarantee every tree true-to-name. You can save agent's profit if you buy direct from us.

Write at once for prices, before it's too late. Address

TRUE-TO-NAME NURSERY

PHONE 2002K

HOOD RIVER, OREGON

Deal Direct and Save Agents Commission

We offer a full line of fruit trees grown on whole-root stock; also nut trees, small fruits, roses, etc. Our prices are sure to interest you. Catalog and price list on application

P. S.—Enclose
this ad

Lafayette Nursery Co., Lafayette, Oregon

RHUBARB FOR PROFIT

A Free Book on Rhubarb Culture

\$1,000 profit per acre. NOW IS THE TIME TO PLANT BOTH THE BERRY AND RHUBARB. BERRY PLANTS OF ALL SORTS. WRITE FOR FREE BOOK TODAY. J. B. Wagner, Pasadena, California, "Rhubarb and Berry Specialist."



STANDARD PRUNE

is the BEST PRUNE for growing, drying, shipping and for quality

The Burbank Cherry

brings the highest prices ever received for cherries

Abundance Cherry

bears enormous crops of big fruit

Leader and National Peaches

are the best early canning and drying peaches

New Shipping Plums A New Canning Pear

and other profitable trees

A postal card now will bring you a new
ILLUSTRATED CATALOG

LUTHER BURBANK, Santa Rosa, California

Chelan, A New Apple

Editor Better Fruit:

Permit us to again call your attention to the new apple Chelan. You will recall that about two years ago we sent you a specimen of this apple for your examination. We have been watching it carefully for several years, and after subjecting it to every test within our power we are ready to say without hesitation that it is a wonder, and we take great pleasure in recommending it to the horticultural world. It has so many points in its favor that it is sure to rank high among the standard commercial varieties.

We first became interested in it on account of its remarkable keeping qualities. The first specimens we ever saw were shown us in midsummer, and they had been kept in a common cellar. As a storage apple it is well nigh perfection. During the winter months it improves in appearance and flavor, and can be placed on the market in late spring.

The tree bears heavy crops every year, and the fruit is of large size, perfect shape and rich color. When ready to pick, the apple is green, with a delicate blush on the sunny side. It is hard and solid, and with its thick skin will stand rough handling. Along about Christmas time the green color begins to change to a deep yellow, and by spring it has changed to a beautiful gold, which with its delicate cheek of red makes it the most strikingly attractive apple in the world. It is crisp, very juicy, and sub-acid. Its quality and fine texture are remarkable.

We have taken great pains to obtain the opinions of the leading pomologists of the U. S., as well as fruit buyers and brokers, and they are unanimous in their endorsement of it.

As to our own personal opinion, we need only say further that we have already planted an eighty-acre orchard of this variety, and this coming spring shall plant two hundred acres more.

In conclusion we wish to say that we are very proud of having discovered this apple. Like most other valuable varieties, its origin is a chance seedling. The original tree stands on an old Indian ranch near the shore of Lake Chelan, Washington, hence its name. It is estimated that the tree is about 21 years old, and it is healthy and hardy, never missing a crop.

We are painfully aware of the fact that there are already too many varieties of apples of the commoner sorts and that a new one, to deserve any attention, must possess unusual merit, but we have no hesitation in saying that no more valuable variety has been introduced in the past century. We are willing to stake our reputation on it, and are doing all we can to introduce it.

This is the first season any of the trees have been offered for sale, as we have heretofore used for our own planting all the trees we could grow.

Very truly yours,

Columbia & Okanogan Nursery Co.
Wanatchee, Washington

YOUR INCOME

GET SOMETHING FOR NOTHING. If you expect to pay next-to-nothing and get good, first-class stock, you are mistaken, that's all. You can't produce a high quality tree for little or nothing any more than you can an axe, wagon, or any implement.

YOU ARE THE LOSER if you let the question of price alone influence your judgment when buying. Your loss is not temporary, but extends over a long period of years, or as long as your orchard stands. The folly of buying cheap stock will be impressed upon you each year as you figure your returns. Better be on the safe side and buy where you are sure of getting just what you want.

Our sales this year could not have so largely surpassed last year's had we not made good in the past.

Catalog free.



Yakima Valley Nursery Company

More Salesmen Wanted

Toppenish, Washington

Orchard Heating and Heaters

By P. H. Troutman, Round Crest Orchard Heater Co.

WE have naturally been very much interested in your orchard heating number—November issue—and there is one thing we think you should call the attention of your readers to. You publish in your November and December issues the bulletin of the Oregon Agricultural College, embracing a report on certain heating tests, which tests, owing to the grade of oil used, did not show the average increase in temperature that is universally conceded is obtained by the use of orchard heaters, no matter what the make. I wish to treat this subject impartially, and therefore I will not mention the names of any of the heaters, taking part in this discussion. The cause of the low temperature obtained during the Oregon Agricultural College tests, which tests were made at an expense of some two thousand dollars, stretching over a period of six weeks, was due solely and to no other reason than that the grade of oil used was inferior. Smudge oil should have a

gravity of from 28 to 31 degrees. The oil used in the Oregon tests ran from a gravity of 14 to 20 degrees and contained very little volatile matter. This oil, in burning, burned very much like the famous gas well near St. Augustine, Florida. This gas contains no oxygen whatsoever, and one can place a delicate fabric in the flame without even having it scorched.

In spite of the low average in increase in temperature Professor C. I. Lewis of the Oregon Agricultural College, one of the best informed men on orchard heating in the United States, says: "Will say that we endeavored to save crops and saved them. Surely there is no advantage in running them much above the danger point. We are working to get a better grade of oil, and with a better grade of oil will get more pronounced results if the temperature drops lower."

As stated in a previous article that appeared in your November issue, it is not a question of whether one orchard

DONALD GROWN NURSERY STOCK

That is what you want, because our stock of fruit and ornamental trees is exceptionally fine. Our fruit trees were propagated from buds taken from bearing orchards; they are vigorous, healthy, and above all true to name; that stocky body, grown on whole roots, makes them an ideal tree to plant. A POSTAL WILL BRING OUR PRICES

DONALD NURSERY CO., Donald, Oregon

TO PROSPECTIVE PLANTERS OF VINEYARDS

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Standard Varieties.
Prices Right and Stock First Class

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Write for prices on Yellow Newtown and Spitzemberg apple trees. My trees are True to Name and first class, grown on high ridge land without irrigation, and give satisfaction.

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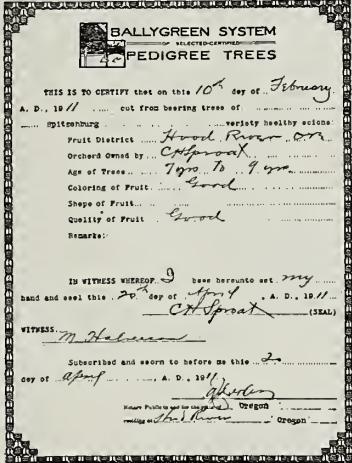
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Similar one on file for each variety Pedigreed.



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OUR trees have the **well-balanced roots and tops** that skilled horticulturists aim to secure. Such trees produce **fruit of quality**. We grow **exclusively selected Trees of Certified Pedigree**.

Descriptive Pedigree Book and Price List sent on request. Write us.

Ballygreen Nurseries
Hanford, Wash.

Reliable Agents Wanted

heater or another will save a crop, for any make now on the market, properly handled, will be just as successful against killing frosts or freezes as any of the other devices. The one great question, and the only one worth considering, is the amount of fuel consumed for the amount of heat produced. I feel it is due to the growers who are interested in the orchard heating subject to give a table of official tests carried on between three orchard heaters concerned in this discussion. These tests were made at Winter Park and Tampa, Florida, the official reports of which appear in the January 20 and February 17, 1911, issues of the Florida Fruit and Produce News of Tampa, Florida. The summary of these tests is as follows, the figures mentioned first in each case representing the orchard heater not taking part in the Oregon test; the succeeding figures represent the two makes of heaters that were used in the Oregon tests: Number of pots per acre, 43, 107, 100; minimum rise in temperature, 1.80, 2.00, 4.00; maximum rise in temperature, 5.00, 5.20, 8.00; average rise in temperature, 2.35, 3.30, 6.00; oil consumed per acre per hour, 11 1/4 gallons, 13 gallons, 15 gallons; oil consumed for each degree of rise in temperature per acre per hour, 10 gallons, 3 3/4 gallons, 2 1/2 gallons.

It is about time that the unscrupulous warfare between orchard heater manufacturers cease, and your paper should take strenuous steps to discourage such childish competition that now exists. All knocks eventually work against those knocking, but even though this is true it is not fair to the grower, who knows little or nothing regarding the merits of the different heating devices, that such competition should be allowed to continue, for until the grower investigates for himself he is at a loss whom to believe, and if he has to experiment for himself it very often results in temporary disaster. I respectfully request that you give this letter space in the February edition in the hope that it will clear up some of the incorrect statements that have been made.

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There is a greater call for fruit trees of all descriptions this season than has been experienced in years—therefore it is urgent that orders be placed

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There is a wagon made that is stronger, more durable and of lighter draft than any other. This wagon is

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Entirely of steel I-Beams, Channels and Angles, solidly held together with large steel rivets, put in hot under great pressure.

Like the steel railway bridge, it is constructed for hardest lifetime service. Strong and durable.

Each front gear and each rear gear is practically one solid piece that cannot come loose or apart.

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This wagon has steel wheels that are trussed and made with a tension,

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the strongest known wheel construction. Every spoke is staggered and forged hot into the tire.

Regardless as to whether the spoke is at the top, side or bottom of the wheel, it always carries its share of the load.

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That roller bearings reduce draft is generally conceded. Of the various styles, the straight roller bearing is the simplest and most successful.

For this wagon the straight roller bearing is especially adapted.

The spindles and hubs are straight. Consequently, as this wagon is equipped with straight roller bearings it is of light draft.

A little book we'll be pleased to send free, tells of a good many more superior features this wagon has.



The Roller Bearing

makes the best growth. No doubt nurserymen will tell you there is no difference between a bud and a graft; probably I should if I were in the nursery business, although you will find the Willamette Valley nurseries recommending the budded tree. If I were planting here I should plant a graft, and in a large commercial orchard I think I would as soon have the 3 to 4-foot as the 4 to 6-foot size.

"In Clarkston Heights were planted, in round numbers, 1,000 acres—not a very large orchard, yet large enough to furnish reliable data as to cost of planting and first year's care. This land was practically all wheat stubble, and only needed to be broken. It was plowed last fall and winter ten inches deep. The soil was left rough—not harrowed that fall. We started planting the first of December and finished about April 1—planting whenever the weather would permit. The planting method is for a permanent apple orchard in thirty-foot squares, with pear, peach or plum fillers in the center of each square. The planting cost on an average of \$2.44 per acre, although on some tracts toward the last, on exceptionally good ground, the cost was as low as \$1.65 per acre. However, I am convinced it is poor economy to try to do planting too cheaply, believing it better to do that work well and economize somewhere else if necessary. Right here I want to say that the time of transplanting appeared to make quite a difference in the growth the trees made this season. The first planted made at least twice the growth that those set out last did, with a gradual graduation between. The trees were headed eighteen to twenty inches from the ground, or knee high. If there were any side branches they were cut off, leaving only one or two buds. This is all the pruning they have received this season; all the limbs that formed were allowed to grow in order to make the trunk more stocky and also to protect it from the sun. Cultivation was begun as soon as the ground was in condition in the spring. The entire

Commercial Apple Orchard Management

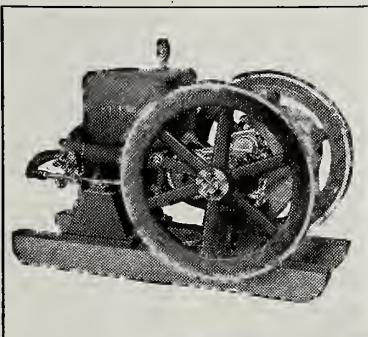
From Lewiston (Idaho) Tribune

MUCH has been said and written on this all important subject. The following address of Mr. W. B. Latham, of the Lewiston-Clarkston Co., before the recent Idaho State Horticultural Convention, is so full of thought that it affords us pleasure to accord it space in our columns:

"A few years ago I would have had no hesitation in giving advice on the subject of managing a commercial apple orchard, but the more experience I have had along this line the less I feel competent to tell anyone else what

he should do, especially if I am not very well acquainted with the local conditions. There are so very many variations of conditions that have to be considered aside from kind and varieties of fruit to plant. For instance, if I were planting an apple orchard in a place with soil and climatic conditions similar to Western Oregon I should use a different grade of tree to what I would use here. By here I mean any of the light volcanic ash, irrigated soils. For Western Oregon my experience has been that the 4 to 6-foot budded tree

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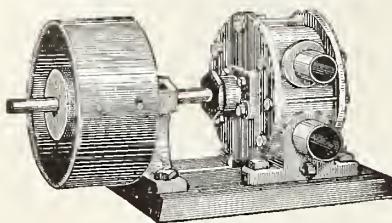
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Seattle, Washington

orchard was gone over first with an ordinary peg-tooth harrow. The few soddy places were thoroughly disced and the entire orchard spring-toothed once. It was then gone over again with the peg-tooth harrow; this left the soil in fine condition for the Kimball cultivator, once every two or three weeks.

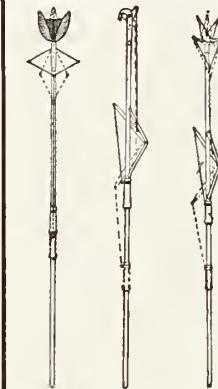
"I stated before that the orchard was planted thirty feet square, with a filler in the center of each square. This makes rows only fifteen feet wide, but by running the rows diagonally to the planting we get the greatest width, about twenty-one feet. This is the direction we cultivated. The discing cost from 80 cents to \$1 per acre. The work with the spring-tooth cost 60 to 65 cents per acre. The peg-tooth harrow cost of cultivating was from 30 to 35 cents per acre. This implement covered the space between the rows at one round and then lapped a little in the center. When the ground is in proper condition the Kimball cultivator is the best thing I have found to kill small weeds and preserve a dust mulch. Our idea was to keep the soil entirely free from weeds, but this was not possible without some hand labor, so in August the entire tract was gone over and any weeds not killed by the cultivator were cut out with hoes. This cost 20 cents per acre. A summary of the cost of cultivation is as follows: Discing 200 acres three times at \$1 per acre each, \$600; spring-tooth 1,000 acres at 65 cents per acre, \$650; peg-tooth 1,000 acres twice at 40 cents per acre each time, \$800; Kimball cultivating 1,000 acres seven times at 30 cents each time, \$2,100; corn cultivating ten times,

\$1,500; hand cultivating 1,000 acres at 20 cents, \$200; making a total of \$5,850, or a cost of \$5.85 per acre.

"Leaving the soil rough as we did to catch the winter rains, and then putting on a cap consisting of a dust mulch as soon as the soil could be worked in the spring, conserved enough moisture to last the season, so a general irrigation was unnecessary, and I am sure you who have visited these orchards will

say they have made a good growth. Someone may ask if I had any pests. Yes, early in the season I had two—one small and one not so small. The smaller was the ordinary pear slug. We got rid of him with a dust spray. We simply picked up a handful of dust and dashed it forcibly over the tree. There was no further trouble from the slug. This was as effective as any spray, and I know of none cheaper. The other

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Bastian You'll want one next season. Just as good as the Pruners.

Pickers Standard lengths 5 to 16 foot.

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Add 5c per foot for each additional foot in length.

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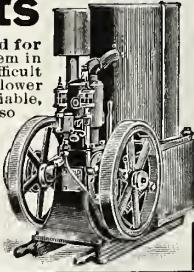
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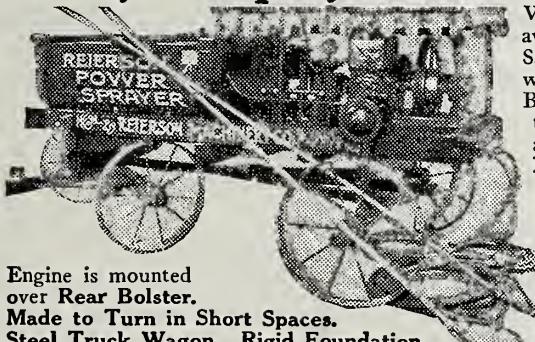
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DETROIT ENGINE WORKS
Spraying Dept., Bulletin No. 108, Detroit, Mich., U. S. A.

trouble was the pocket gopher. They not only ate the roots, but even pulled the young tree under the ground and ate it. Poison was the only remedy we tried. The bait used was corn soaked in water in which strychnine had been dissolved, and pieces of carrots and raisins with a crystal of the poison in them. The method was to make a hole with a sharp stick in the burrow, drop a piece of poison bait in and cover the hole, taking care not to fill the burrow. We found the carrot and raisin much the more effective bait. Along in August we made an estimate of our loss and it was about three and one-half per cent. However, after the grain harvest the rabbits barked some of the trees and increased the percentage somewhat. We tried three methods of protection from the rabbits. First, Yucca palm tree protectors were placed around the trees. The protector itself cost one and one-half cents per tree and the labor of putting these on increased the cost one and three-quarters cents per tree. Second, tar building paper was used, cut up into pieces about the size of the wooden tree protector and fastened with ordinary paper clips, such as you use in the office (illustrate). The cost of this, including labor, was one and one-tenth cents per tree. Third, whitewash, consisting of lime, soap and crude carbolic acid was applied. This, with the cost of application, was only one-quarter cent per tree. The best brush I found for applying this was to take about eighteen inches of one or one and one-half-inch grass rope, wrap all except about three inches of this with wire and ravel out this three inches for the brush, using the wrapped part as a handle. With the exception of replacing any trees that failed to grow, this completes the work for the first season. This also completes my talk."

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paying \$2 a month, and enjoy a very special price direct to you or from our nearest agency. A magnificent machine—a stupendous offer.

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Hood River, Oregon

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WE publish free in this column the name of any fruit growers' organization. Secretaries are requested to furnish particulars for publication.

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Eugene Fruit Growers' Association, Eugene; Ashland Fruit and Produce Association, Ashland; Hood River Fruit Growers' Union, Hood River; Hood River Apple Growers' Union, Hood River; Grand Ronde Valley Fruit Growers' Union, La Grande; Milton Fruit Growers' Union, Milton; Douglas County Fruit Growers' Association, Roseburg; Willamette Valley Prune Association, Salem; Mosier Fruit Growers' Association, Mosier; The Dalles Fruit Growers' Union, The Dalles; Salem Fruit Union, Salem; Albany Fruit Growers' Union, Albany; Coos Bay Fruit Growers' Association, Marshfield; Estacada Fruit Growers' Association, Estacada; Umpqua Valley Fruit Growers' Association, Roseburg; Hyland Fruit Growers of Yamhill County, Sheridan; Newburg Apple Growers' Association, Newburg; Dufur Valley Fruit Growers' Union, Dufur; McMinnville Fruit Growers' Association, McMinnville; Coquille Valley Fruit Growers' Union, Myrtle Point; Stanfield Fruit Growers' Association, Stanfield; Oregon City Fruit and Produce Association, Oregon City; Lincoln County Fruit Growers' Union, Toledo; Rogue River Fruit and Produce Association, Medford; Mount Hood Fruit Growers' Association, Sandy; Northeast Gaston Farmers' Association, Forest Grove; Dallas Fruit Growers' Association, Dallas; Northwest Fruit Exchange, Portland; Springbrook Fruit Growers' Union, Springbrook; Cove Fruit Growers' Association, Cove; Santiam Fruit Growers' Association, Lebanon; Washington County Fruit Growers' Association, Hillsboro; Benton County Fruit Growers' Association, Corvallis; Sutherlin Fruit Growers' Association, Sutherlin; Brownsville Fruit and Produce Association, Brownsville.

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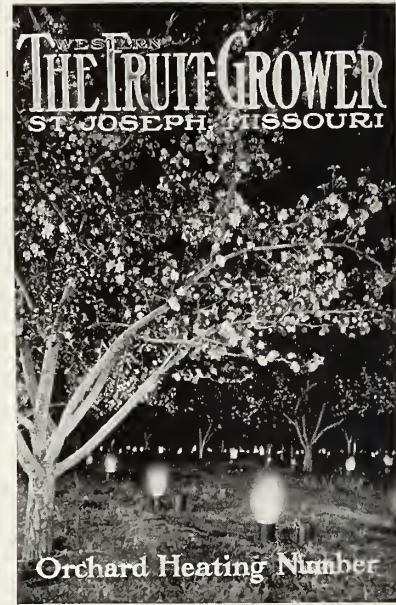
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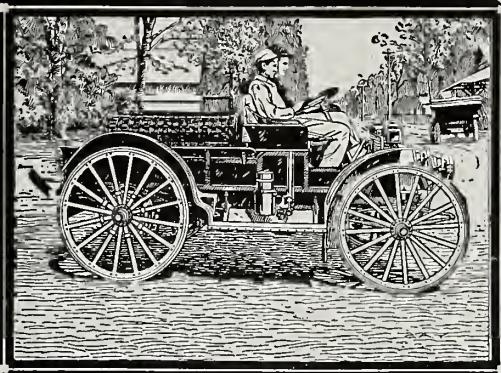
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San Juan Fruit and Produce Association, Farmington.

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Apple Tree Anthracnose

By H. S. Jackson, Plant Pathologist Oregon Agricultural College

THE Apple Tree Anthracnose, as it is best known in Oregon, is a disease of the apple tree which is peculiar to the Pacific Northwest. It occurs in no other part of the United States as a serious disease. Its distribution is as follows: It extends from British Columbia to the southern part of Oregon, and possibly into California. It also occurs in Idaho. It is not known how far east the disease extends, though it has once been reported as far east as Nebraska. In Oregon it is, with the possible exception of the apple scab, the most serious fungous disease with which the apple grower has to deal. The disease is characterized by the appearance of dark colored sunken cankers, which are found most abundantly on the younger branches.

The cankers are first to be observed in the winter as round dark colored spots which slowly enlarge and elongate, making little visible growth during the dormant season, but, on the advent of spring and the consequent

renewed activity in the life processes of the tree, continue to grow rapidly. The cankers are deeply sunken, dark in color, with a limiting crack around the edge. Sometimes the cankers are so large that they girdle branches to such an extent that the entire tops may be killed. In some cases young trees are killed by cankers forming on the trunk. These are perhaps extreme cases, but by no means uncommon. As usually seen the disease is found to produce few or many cankers on the younger branches of trees, occasionally girdling a twig or branch. The bark in mature cankers is found to be dead to the wood. After the active spread ceases the bark may cling in the cankers for one or more seasons, finally falling away, leaving an ugly scar which heals slowly. When a number of cankers occur on the branches the proper distribution of the elaborated food is interfered with and the tree suffers. The cankers are caused by a parasitic fungus known technically as *Gloeos-*

porium malicorticis Cordley. The fungus starts growth in the tissues in the fall or early winter, the mycelium develops in the tissues of the bark slowly, breaking them down and causing the canker.

If a mature canker is examined in midsummer little elevations in the bark are easily observed. They are at first more or less conical in shape and are thickly scattered in the sunken area. They gradually enlarge and finally burst the outer layer of the bark and expose the cream-colored mass of fungous tissue. These are the ascervuli or fruiting bodies and bear the reproductive cells of the fungus, which are very minute, curved, colorless bodies called spores. These are invisible to the naked eye except in mass and are produced in countless thousands in the pustules already described. They are held together during the dry weather by a sticky substance and are only liberated by the first fall rains, when they are broadly distributed by wind and rain, often being carried for long distances. Moisture is necessary for the growth of these spores, which under proper conditions grow out into a slender tube, which may penetrate the bark of the apple, ramify in the tissues and kill them, producing the typical cankers. It is possible to isolate the organism causing this disease and to grow it in pure culture. By taking a portion of such a culture and inserting it in the bark of a healthy tree the typical cankers of the disease are produced. This proves beyond a doubt that the cankers are caused by the fungus.

Infection takes place in the fall at any time after the first fall rains. The great majority of the infection doubt-

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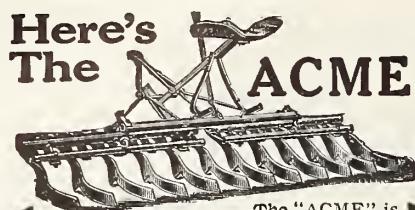
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less occurs from about the middle of October to the first of December. After infection the fungus spreads slowly in the fall, remaining practically dormant during the winter and begins active growth again in the spring. The spread of the fungus in the tissues ceases early in the summer, and when the canker is mature can be found only in the sunken bark. There is no evidence to show that the cankers grow in size after mid-summer. It is true that the mycelium or vegetative stage of the fungus remains alive in the bark of old cankers at least till the second autumn after the infection, and spores like those produced in the cankers the first year after infection are found in limited quantity. The second year's growth, however, is as a saprophyte on the dead bark which still clings to such cankers. The presence of another spore stage, the sexual spore which is common in the life history of the fungi of this nature, has not been proven to be present in the life history of the apple tree anthracnose. Besides the cankers on the branches we sometimes find a disease of the fruit caused by the same fungus. On the fruit the spots first appear as small brown sunken areas, which gradually enlarge, producing a rather soft rot. Finally pustules are produced which bear spores like those found in the cankers on the branches. Apple tree anthracnose, however, is not to be considered a serious trouble of the fruit. The spots occur only when the fruit has been left hanging on the trees for some time after the fall rains begin. In seasons when the rains begin early it will be more prevalent than when they occur later.

In treating a fungous disease of this nature it is important that the tree be covered with some fungicidal substance that will prevent the germination of

the spores, and so keep the fungus from entering the tissues. After the fungus once enters the bark no spray can be applied that will kill the fungus and not kill the tissues as well. The treatment must be preventive and not curative. It has formerly been recommended to spray with bordeaux mixture or lime-sulphur as soon as the fruit is picked. It has frequently happened that large growers have not been able to spray owing to the fact that by the time the apples were picked the season was so far advanced that, on account of the frequency of the rains, no opportunity was offered. On this account an experiment was conducted in the Wallace orchard at Salem to test the effect on the fruit of several different strengths of lime-sulphur as well as the bordeaux mixture and the ammoniacal solution of copper car-

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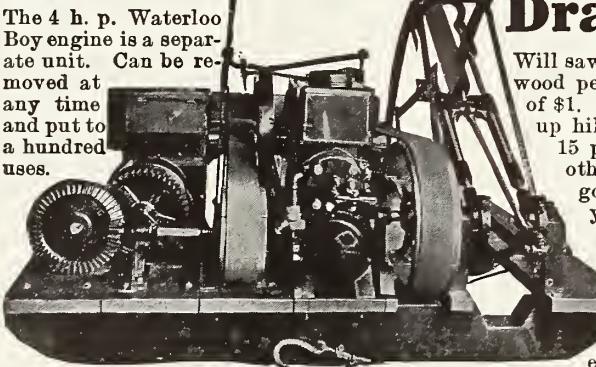


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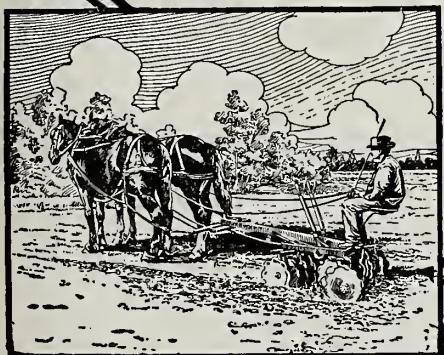
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bonate. The variety sprayed was the Spitzenberg, and it was found that the deposit made on the fruit by the application of spray during the last week in September did not injure the fruit in any way or seriously interfere with the uniform coloring. Occasionally, however, where the bordeaux mixture or lime-sulphur collected in drops and made a thick deposit the color did not develop uniformly, and caused a slightly mottled appearance when the fruit was wiped. When, for the reasons given above, it is considered desirable to spray before the fruit is picked we feel safe in advising growers to use any of the above mentioned mixtures as late as possible before the first fall rains. The bordeaux mixture 4-4-50 is to be preferred, since it has been shown to be the best fungicide for this disease. This spraying should be followed by another application as soon as possible after the fruit is picked, using winter strength bordeaux mixture 6-6-50. In the very seriously infested orchards a third application might prove beneficial and should be applied about two to three weeks after the second. Badly affected branches should be pruned out preceding the fall spraying. The method outlined above is especially recommended for the purpose of cleaning up an orchard that has become badly infested. Under ordinary weather conditions when anthracnose is not abundant, or when an orchard is sprayed merely for the purpose of preventing the disease from obtaining a foothold, the last two applications are usually sufficient. Good results have been obtained by the use of one annual application of bordeaux mixture as soon as possible after the fruit is picked.

Where practical the cankers may be cut out before fully formed during the winter or early spring. To do this it is only necessary to shave off the outer bark. The tissues will then dry out, the trees throw off the disease and the production of spores will be prevented. This method is especially recommended for young orchards where all parts of the tree may be reached from the ground. It is also advisable where practical to cut out the dead bark of old cankers, making a clean wound. The exposed wood should be painted. Wooly aphis works under the bark of old cankers and prevents the normal formation of callous, which makes the above mentioned treatment especially desirable. Heart rot fungi may also gain entrance to the wood through the wounds caused by this disease if they are not properly cared for. It is probable that the fungus is a native of the Northwest and grew on some native species of the apple family before the cultivated apple was introduced. This native host has never been discovered, or, if so, has not been made public.

Editor Better Fruit:

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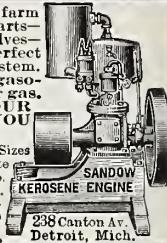
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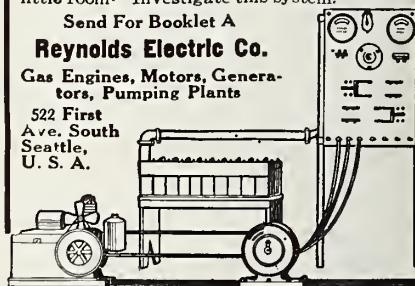
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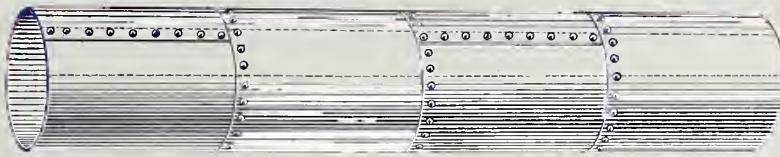
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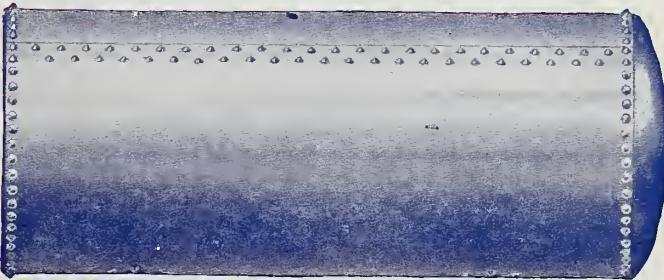


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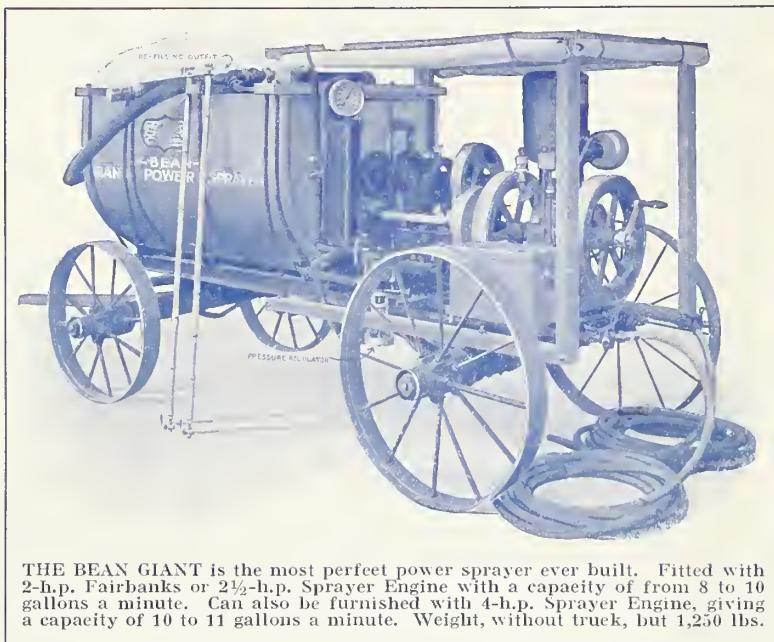
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The result of planting Orenco's dependable, profitable trees.
What kind are you going to plant?

BEAN POWER SPRAYERS

Have Feature After Feature Found In No Other Outfits



THE BEAN GIANT is the most perfect power sprayer ever built. Fitted with 2-h.p. Fairbanks or 2½-h.p. Sprayer Engine with a capacity of from 8 to 10 gallons a minute. Can also be furnished with 4-h.p. Sprayer Engine, giving a capacity of 10 to 11 gallons a minute. Weight, without truck, but 1,250 lbs.

Bean Power Sprayers are big profit makers for the fruit grower. They represent the very latest thought in power sprayer construction, having every good feature to be found on other outfits and possessing many features that are found exclusively in the Bean line. We have power outfits from \$137.50 up.

BEAN PRESSURE REGULATOR IS THE GREATEST SINGLE IMPROVEMENT since power sprayers first came into general use. It maintains a constant high pressure and can be adjusted in three seconds. When the nozzles are shut off the engine works free, showing that it does not work against the pressure unless the machine is in use. This regulator saves from a fourth to a third of the gasoline, and the same proportion of wear and tear on engine and pump.

BEAN BELL METAL BALL VALVES DO AWAY WITH ALL VALVE TROUBLES. They can't clog. They can't stick. They can't give trouble in any way. The balls work on reversible seats. When one side

is worn turn the seat over and use the other side. Simply loosen one set screw.

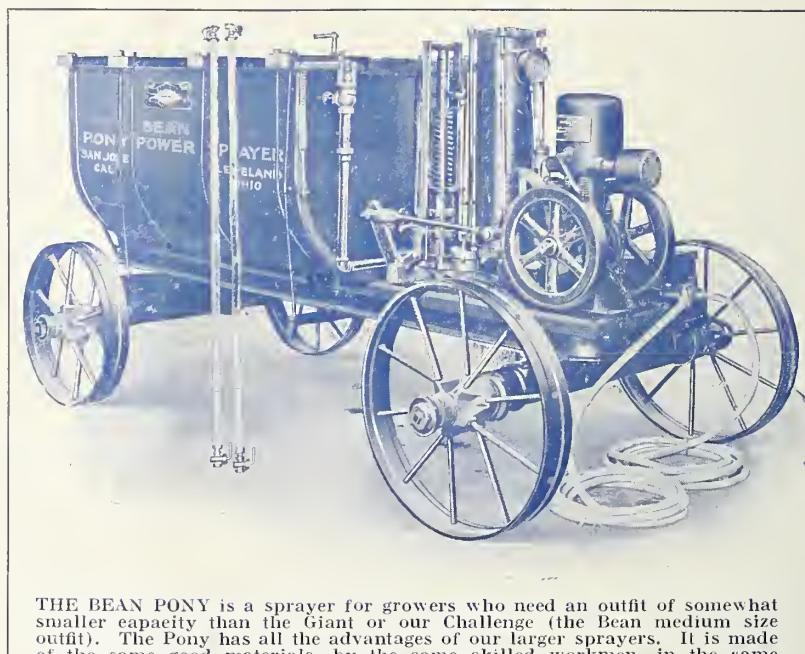
BEAN PORCELAIN-LINED CYLINDERS NEVER WEAR OUT. THE ADVANTAGES of the porcelain lining are evident to every grower.

BEAN GIANT POWER SPRAYERS HAVE UNDERNEATH SUCTION. This convenience is well worth considering. It enlarges the capacity of the pump, makes priming unnecessary and does away with the constant renewing of cracked suction hose.

BEAN SPRAYERS HAVE STEEL FRAMES INSTEAD OF WOOD. THEY ARE MORE RIGID and more satisfactory in every way. All our power outfits are now equipped with steel frames.

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Send for a copy of our new catalog of hand and power sprayers and pump accessories.



THE BEAN PONY is a sprayer for growers who need an outfit of somewhat smaller capacity than the Giant or our Challenge (the Bean medium size outfit). The Pony has all the advantages of our larger sprayers. It is made of the same good materials, by the same skilled workmen, in the same perfectly equipped factory. We guarantee a pressure of 200 pounds. Weight, including truck, only 1,250 pounds.

Bean Spray Pump Co. 213 West Julian Street SAN JOSE, CALIFORNIA

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